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LIGHT ⁘ HEAT ⁘ POWER ⁘ BYE-PRODUCTS

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EDITORIAL NOTES.

Institution of Gas Engineers.

In four weeks' time, the gas profession will be busily occupied with the proceedings at the Annual General Meeting of the Institution of Gas Engineers. The provisional programme which has been arranged informs us that, on this occasion, we are to take advantage of the generous hospitality of the Council of the Institution of Electrical Engineers, as in 1922 and 1924, and utilize for the technical proceedings the accommodation of their home on the Victoria Embankment, near Waterloo Bridge. The President of the Institution—Mr. John Wilkinson, O.B.E., Engineer and Manager of the Nottingham Corporation Gas Department—may be assured of a large attendance; indeed, the members themselves will be very pleased to meet together from all quarters of the country to compare notes on their experiences last year, and to discuss the very live problems which are at the present time before the industry, and have vital bearing upon its future progress. Everything at the moment, with the one exception of sulphate of ammonia, looks promising; and, so far as gas business itself is concerned, there appears to be nothing, within the length that human vision can penetrate, which will stay its progress. But to enable that progress to continue at as high a level as possible, there are various developments in our legislative powers which are absolutely necessary, and which, as we all know, the National Gas Council have well in hand. But developments and changes external to our industry may necessitate a reconstruction of practices in respect of secondary products of coal carbonization. Glancing round, it is seen that, in these times, there is much to talk about of a constructive nature in connection with the industry. For these reasons, apart from the programme of arrangements for the meeting, the opportunity for personal conference is bound to be taken to the fullest possible extent.

On Tuesday and Wednesday, June 14 and 15, there will be sittings in both morning and afternoon. As usual, the general business will first occupy consideration, including the presentation of the H. E. Jones London Gold Medal to Mr. C. H. Rutter, of Brighton, for the engineering paper he presented last year, and of the diplomas awarded this year under the Institution Education Scheme. The main feature of the first morning sitting will, of course, be the address of the President. Afterwards, the reports of Committees will be taken in hand, to be succeeded (at the afternoon sitting) by the reading and discussion of papers, regarding which more information will shortly be available. On Wednesday morning, the contributors to the Benevolent Fund will meet; and then, following the disposal of a further two or three items of general business, consideration of papers will be resumed. The contributions will also occupy the full time of the sitting on Wednesday afternoon; and their discussion will be brought to a conclusion at the morning sitting on Thursday, the proceedings at which will be wound-up by the scrutineers' report on the election of officers and Council, together with the presentation of the Presidential Certificate.

The planned social events will include a reception and dance at the Connaught Rooms on Tuesday evening, by invitation of the President and Mrs. Wilkinson; and on Friday there is to be the visit to Nottingham, where the visitors will be heartily received by the Mayor (Mr. Councillor Freckingham), the Chairman of the Gas Committee (Sir Albert Ball, J.P.), and the President. The programme for the visit is one which, we feel sure, will cause the booking for this event to be one of the largest on record. Apart from the hospitality which will be extended to the members on the occasion, an opportunity is to be given for paying a visit to the Basford Gas-Works, and several manufactories of general interest in the city. Of course, the ladies are included in the invitation for the excursion.

Psychology and Bad Manners.

A nice question has been raised in the Plymouth Town Council. It concerns psychology and bad manners. It arose in this way: A year or so ago Mr. J. R. Bradshaw obtained the appointment of Engineer and Manager of the Devonport Gas-Works of the Plymouth Corporation. He has recently resigned, and has been selected for the position of Engineer and Manager to the Hartlepool Company, in which capacity we wish him the utmost success. The Chairman of the Plymouth Gas Committee (Mr. J. Clifford Tozer), at the meeting of the Town Council last week, bore testimony to the considerable ability Mr. Bradshaw had shown during his sojourn with them. The gas business, under his management, has greatly increased; and a scheme has been submitted by him which would mean an improvement of the supply and the maintenance of the general efficiency of the works. We can quite understand how, in these circumstances, Mr. Tozer, and all right-minded men on the Council, sincerely regret the departure of their Engineer—and apparently a departure to happier conditions. The conviction—we might perhaps say, knowledge—of the Chairman of the Gas Committee is that Mr. Bradshaw did not resign solely for the reason that Hartlepool offered a greater sphere; unhesitatingly he says that, in the main, his resignation was on account of the treatment meted out to him by certain members of the Council and the Committee. "For some reason," said the Chairman, "there were certain members of the Committee who undoubtedly lack the first essentials of being gentlemen, and who show an absolute lack of respect for the chief official of the gas undertaking." And the reason advanced for this attitude is that Mr. Bradshaw refused to be intimidated and domineered over. We admire his courage. We know there are other officers in municipal service who would gladly, given the opportunity, take an appointment in a company for no other reason than to escape from the insults to person and office which certain of the more modern members of local authorities choose to heap upon them. The statement by Mr. Tozer was confirmed by Mr. Hellen, who declared, without fear of contradiction, that their Engineer had been driven away.

The newspaper report of the meeting of the Plymouth Council does not say that Mr. Tozer mentioned who were the men who were guilty of the behaviour which had (as he asserted) made things unpleasant for the Engineer. But the shafts manifestly went straight to the target for which they were intended. On behalf of the labour members, Mr. H. M. Medland denied that they had ever departed from the proper bounds of conduct. Of course, this depends upon the definition Mr. Medland gives to the term "proper bounds." Between our view and that of Mr. Medland on the point, there might be a fairly wide division. There was something in the nature of a taunt in the combination of congratulations to Mr. Bradshaw on having obtained

"a better job," and the advice to him to study psychology. Perhaps he has already done so, and has been left wondering regarding those who have thought fit to play the part of tormenters, instead of assisting him to render the best possible service to the undertaking. Probably it would not be out of place for him to reply to Mr. Medland's advice that it would be an excellent thing if certain gentlemen who are supposed to represent the interests of the ratepayers generally would study and practise good manners. Bad manners do not add to their personal dignity, nor assist in their service to the community. A good deal has been seen of this sort of thing of late not only in municipal chambers but in the House of Commons; and the injury it is doing to the cause of labour is greater than the myopic perpetrators appear to appreciate. Some of them (not by any means all) cannot understand that representation demands good statesmanship. The idea seems to be deeply established among them that their main functions are to badger the chief officials who have men working under them, to undermine respect for their authority, and to make discipline a thing to be flouted rather than observed. An indication of this was given when Mr. Medland said the labour members did not intend to allow the setting-up of a bureaucracy inside the Council; and they would sift every time the advice given by any official of the Council. That clearly shows the position. Some people, other than labour representatives, we know, forget at times that common politeness and fair play are accepted rules among men; but when that forgetfulness gets elevated to a policy, and introduces grit into the mechanism of municipal government—preventing its smooth working, and inflicting injury upon the interests of the community—the time has come to protest against it, to suppress it, and to resist its further growth. We believe thoroughly in representation in national or local government of all sections of the community, just as we believe that all representatives should work for one goal, and that the common good.

Fuel Prospects and Qualified Men.

In later columns we publish the report of the Livesey Professor (Prof. John W. Cobb) on the work of the Department of Coal Gas and Fuel Industries (with Metallurgy). There is one aspect of this interesting document which requires emphasizing. There is no doubt that there is a little disappointment on the part of Prof. Cobb that while the number of students continues to be about maintained, there is not the evidence of a greater interest by an increase of entrants for the study of the highly important subjects which come within the province of the Department. This seems to indicate an outside lack of appreciation of the movements that are taking place. Power is giving place to fuel in scientific and practical consideration. Men recognize now—even many of our political masters—that the positions of power and fuel in the interests of national economy and efficiency should have been reversed; that fuel and heat should, in the rational order of things, have had precedence, with power succeeding as a product. The report of the Royal Commission on the Coal Industry shows this; and as an outcome, we have now the National Fuel and Power Committee, before whom Prof. Cobb has already given evidence. We have the Fuel Section of the Society of Chemical Industry very hard at work, and the new Institute of Fuel Technology has banded together men who are concerned in the economical and efficient utilization of fuel in all industries. There is a distinct movement to great and practical changes in fuel applications, which will, as time passes, progressively make their impress upon every industry in the country. This must be so, as there is to-day a general recognition of the fact that it is not to our credit that raw fuel is not, even in the year 1927, used to the best advantage. We are being impelled in this movement by our national interests, which are not summed up in the words "coal conservation." When we look abroad we see what our chief trade competitors —America and Germany—are doing in respect of fuel economy and efficiency, and in the scientific training of men to promote and safeguard those essentials to their national and industrial progress. These are matters which should be grasped by responsible men; and the youth of to-day who are examining the prospects for professional work should not miss the signs of openings plainly projecting themselves from the world of fuel utilization. Let them reflect that our present position, which is admitted not to be good in respect of fuel, is the product of practice, with little science; and that the movements which are being made will correct this, with the result that more scientifically trained men will be needed. When this is realized, there should be a growth of the number of students in all matters relating to fuel. We know of no brighter prospect. The list of appointments gained by the students in Prof. Cobb's Department is an indication of the scope of work that is opening up, and will, we firmly believe, do so at greater pace in the future. For scientifically trained men, the gas industry and industrialists look more and more to the educational centres; and what has to be ensured, but can only be ensured by the supply of new students, is that as requirement develops (as there is confidence it will do), there will not be a shortage of men available to meet it. We congratulate Prof. Cobb on the growth of the work of his Department in the matter of research, and hope the time is not far distant when he, his staff, and the work will be in the full enjoyment of the building which is now shared with the Mining Department, so that there may be freedom for that expansion which is so essential, in the interests of both the Coal Gas and Fuel Department and the industries it serves.

First Scheme in Electricity Re-Organization.

The curtain has been lifted on the first stage of the national re-organization of electricity generation, under the Electricity Supply Act of last year. Scotland is the favoured scene. It may be that this is due to its representing a less difficult problem than will many of the other areas of the country, or perhaps it is a compliment to the Chairman of the Central Electricity Board, Sir Andrew Rae Duncan. The scheme, which has been prepared by the Electricity Commissioners, has been transmitted to the Central Board for their consideration. The area with which it deals extends from Montrose and Haddington to the southern boundaries of the County of Ayr, and Clydeside. Thus it will be seen that the Electricity Commissioners have included in their plans practically the whole of the industrial, shipbuilding, and coal-field areas of Scotland. The territory measures approximately 4980 square miles, and contains a population, according to the last census, of 3,761,200. At present there are within it 42 authorized undertakings, owning 36 generating stations. The quantity of electricity sold in the area represents 10·8 p.ct. of the total in the United Kingdom. Last financial year 712 million units were generated; and the scheme makes provision, on the assumption that there will be an average growth of 88 million units a year, up to 1933-34. Of the 36 generating stations in existence at the present time, only ten have been selected for operation by the Board, which means that 26 will eventually be scrapped. Of the ten, four will later on pass from the scene of their activities, leaving six to provide electrical energy for the area. But of these, four will be considerably extended between 1932 and 1938, and two new ones will be constructed. Thus ultimately the area will have its electricity generating plant concentrated in eight stations, which will be interconnected by a series of high-pressure main transmission lines—the interconnection releasing for revenue-earning purposes about 88,000 kw. of plant now kept as spare, and representing about £1,670,000 of capital. For the transmission lines, the Commissioners have adopted a pressure of 132,000 volts between phases; and this will be the standard voltage for primary transmission lines throughout the United Kingdom.

These particulars, referring to one area only, show what an enormous amount of work has to be accomplished. It is obvious that it will take many years before the burden of new capital expenditure can be lightened; and the predicted economies, if they mature, can possibly be brought to bear upon the price of electricity to ordinary consumers. It is a gigantic speculation. A preliminary to the great re-organizing work is the standardization of frequency, which was a troublesome topic during the controversy which raged round the Electricity Act. The Commissioners deliberately state that comprehensive regional schemes cannot be carried out with full economy in areas

where there are differing systems without first effecting standardization. It is due to this, they explain, that they have given early attention to an industrial area in which a non-standard frequency has been widely developed; the object being to avoid expense on non-standard plant, and to hasten the time when manufacturers, as well as undertakers, and consequently consumers, will obtain the benefits arising from the production of electrical machinery for one uniform frequency. It is proposed to work on a standard frequency of 50 cycles per second. In several cases—and important ones—the existing frequency is 25; so that a big adaptation of plant will be required. An illustration of this may be given. The Clyde Valley Electrical Power Company have consumers possessing 6880 motors, which will have to be changed-over to suit the new frequency. In the area of the Glasgow Corporation, there are 1621 motors which will be similarly affected. In these two areas, it is estimated that the whole change-over will cost £1,141,000, while for the whole of Central Scotland the figure is given as £2,921,250. It is seen that, during the next decade, capital expenditure on the high scale will be continuous under the scheme as at present projected, so that the area will be committed to considerable uncertainty and speculation for a long period to come. It is contemplated that, by the end of 1933-34, the capital expenditure of the Central Board under the scheme will be £5,125,284; and of the owners of selected stations for extensions, £850,000—making together £5,975,284. The expenditure of the Central Board is divided between transmission lines and transforming stations (including capitalized interest), £2,204,034; and standardization of frequency, £2,921,250. But it must not be overlooked that by 1938 there will be two new stations to be erected. Thus we see an expenditure contemplated by the end of the year 1933-34 of nearly six millions sterling, the repayment and interest charges on which will not be light. But the Electricity Commissioners offer some consolation to the electricity suppliers in the area by telling them that, in their view and in the absence of this scheme, they would have to make provision under their individual systems by the year 1933-34 for the installation, in existing or new stations, of generating plant amounting to 250,400 KW., to meet the load in that year, and that this would represent a capital expenditure of £3,312,320. Thus we see that the Commissioners' scheme will represent an expenditure of £2,662,964 above that which would have had to be faced by the individual undertakings by 1933-34. The reading of this is that capital charges will be heavier for several years to come than would have been the case had development proceeded normally.

It is clear that the Commissioners are highly optimistic as to the benefits that are, at some time or other, going to accrue to the electricity undertakings. Exactly when is another matter. The estimate of gross savings to the suppliers in the area in the four years 1930 to 1934 is £894,000, or an average of nearly a quarter of a million per annum. It will be marked that nothing is said of savings before the year 1930—in fact, it is not anticipated that a supply under the scheme can be commenced before August, 1929. If the savings do not accrue after 1930, then the undertakers will have to look for them to the dim and distant future. It is stated by the Commissioners that, if the comparison were carried beyond the period under review, it would show progressive savings on capital expenditure under the scheme as contrasted with individual development; while, on completion of the scheme, a proportion of the spare plant in existing stations will be released for revenue-earning purposes—such plant amounting in all to 87,890 KW., and representing an actual expenditure of about £1,670,000. There are indications here and there in the report that confidence is not undiluted. We are, for instance, told that the capital already spent on the thirty less efficient stations now existing, but which the scheme contemplates will be closed down, must all be paid-off or discharged; and it is only when this is done that the full value of the new system will accrue. Again, it is anticipated that large industrial consumers will by 1929-30 enjoy electricity at 0·6d., and four years later at 0·5d. per unit. But the prospect of an early reduction in the cost of electricity to ordinary consumers as a result of the scheme is barely mentioned by the Commissioners. On the facts as presented, however, it appears clear that, for many years to come—with heavy capital expenditure proceeding, supplemented by capitalized interest—there will have to be a maintenance of charges for energy to provide for the service of capital.

We can well understand that the manufacturers of electrical plant, as they contemplate this first example of the schemes under the Act, will rub their hands with glee, for this, with the other schemes which the Commissioners have in hand, should for a great number of years keep them actively and profitably employed. It has been indicated by the Commissioners that they hope to complete in the next two years schemes dealing with Central England; Yorkshire, Lancashire, and Cumberland; South East England (including London and the Home Counties); South-West England; and South Wales. Thereafter, the remaining areas will be dealt with as may be expedient.

Modern Mond Data.

IT is highly essential that the technical members of the industry should keep well abreast of the developments in kindred industries. Our attention has recently been called to the fact that much of the data in the text-books in regard to the Mond system of gas production is obsolete and misleading; and it is well that correction should be made. The system, like other gas-making methods, has made progress, and in several directions. The composition and heating value of the gas has been improved. The recovery of practically the same amount of sulphate of ammonia has been achieved when using only 1 lb. of steam as when employing 2½ lbs. There is now a high yield of tar of low-temperature quality and high market value, instead of the poor quality previously made, which was of low value and difficult to handle—in short, was almost a nuisance. The economy and thermal efficiency of the system has been raised; and this by the combination of the low-temperature production of the secondary products (oils, pitch, and ammonia) with the gasification process in one operation, which is the distinctive feature of the modern process. In the improved gasification process, the yield of low-temperature products is brought about by the transfer of heat to the fuel in the distillation zone in a gradual, yet direct, manner by the intimate contact of the hot producer gas evolved in the lower part of the producer with each particle of fuel in the upper zone. What has been aimed at is to maintain the fuel in the top or primary zone at a temperature most suitable for the production of the largest quantity of tar oils and low-temperature fractions, while the heat is evenly distributed throughout the whole mass. The tar oils and the ammonia evolved in the secondary and tertiary (gasification) zones are passed through zones that gradually become cooler and cooler—thus preventing cracking of the oils and destruction of the ammonia. Further, in the operation of the new process, we understand, there is practically no dust or soot produced; whereas in the old process this was a considerable amount, which required much labour for its removal from the plant, due to its frequent simultaneous deposition with the thick tars in the mains. This absence of dust and soot is accounted for by the fact that a much reduced volume of steam enters the producer, and the temperature and volume of the crude gas leaving the producer are lower.

Glancing back at the old process, it will be remembered that, when using cheap slack, it was possible to recover from 90 to 95 lbs. of sulphate of ammonia per ton of fuel gasified; the gas yield being about 135,000 c.ft. of 135 B.Th.U. net. With the cheap fuel of former times, these results (which were obtained by introducing into the producer 2½ lbs. of steam per lb. of fuel gasified) represent a very economical source of heat. But with the advance in the cost of fuel and labour, &c., of late years, the economic value of the process has been materially affected. Technical experiment, however, has (as already explained) brought about an improvement in the economy and efficiency of the system. Working with coal of a net calorific value of 12,150 B.Th.U. per lb. with the new process, 122,000 c.ft. of gas per ton of dry fuel gasified are obtained, as compared with 138,000 c.ft. with the old process; the net calorific values of the gas being respectively 178 B.Th.U. and 134 B.Th.U. per c.ft. This represents an efficiency for the new low-temperature process of 80 p.ct., as compared with 68 p.ct. with the old process. It will thus be seen that, by the former, a much richer producer gas is made than was obtained from hot-gas pro-

ducers. The gas under the new system contains 21 to 22 p.ct. of carbon monoxide, as against only 11 p.ct. with the old process, and 8·3 p.ct. of carbon dioxide, as against 16 p.ct. with the old process. The hydrogen, although higher than in hot-gas practice, does not replace the carbon monoxide as formerly, but is in addition thereto. The calorific value is thus very high for producer gas. The nitrogen remains at very much the same figure—45·3 p.ct., as against 45·5 p.ct. in the old process. Calculating out the gas figures, it is found that with the old system, and on the net basis, 184·92 therms were produced from coal having a net calorific value of 12,150 B.Th.U. per lb., while in the new system 217·16 therms are produced. The calorific value of a ton of the coal used is 272·16 therms. Thus is found an increase in the gas efficiency, as already mentioned, from 68 p.ct. to 80 p.ct. The gas, having a net calorific value of 178 B.Th.U., has a large range in industrial applications. It is also revealed that the high yield of sulphate of ammonia per ton of dry fuel gasified is practically the same as formerly; being with the new system 90 lbs., as compared with 95 lbs. with the old—in the former case using only 1 lb. of steam, as against 2½ lbs. in the latter. The average yield of dry tar and oils per ton of dry fuel gasified is now from 21 to 22 gallons, while in the old process it was of such low grade that the value was negligible.

In an estimate of the annual working costs of the new low-temperature producer plant using 39,500 tons of coal at 20s. per ton, the debits, on full load for 7488 hours, total to £56,328; while from sulphate of ammonia, tar oils, and pitch credits are obtained of £39,916, which leaves a total annual cost of £16,412. The total volume of 182 B.Th.U. gas generated per annum is 3,681,600,000 c.ft., which works out to 1·07d. per 1000 c.ft., or 1·82 therms. Working on a 60 p.ct. load for 7488 hours, the debits amount to £38,241, and the credits to £23,965—the total annual cost being £14,276. The gas produced amounts to 2,208,960,000 c.ft.; the cost averaging 1·55d. per 1000 c.ft., or 1·82 therms. The capital cost of this plant is £32,000. It will be seen from this that for considerable industrial use the new method of operation provides a cheap therm. The only trouble about the computation is that the value of the sulphate of ammonia in the credits is taken at £14 per ton.

New Gas Legislation.

The work of recasting certain paragraphs in the Memorandum relating to this matter having been completed by the Gas Legislation Committee of the National Gas Council, the draft has now been approved by the Central Executive Board, and a copy lodged with the Board of Trade, with a request that the Council should have an early opportunity of discussing with the Board the points raised.

Low-Temperature Carbonization.

The Duchess of Atholl stated in the House the other night that the Gas Light and Coke Company are collaborating with the Government in a technical and commercial investigation into low-temperature carbonization. Further information will be obtained from our "Parliamentary Intelligence."

National Fuel and Power Committee.

Sir Alfred Mond recently stated that this Committee have got well to work, and have received a considerable amount of valuable information. Among the earliest evidence given to them was that submitted, on behalf of the National Gas Council, by Prof. Cobb and Mr. Thomas Hardie. This was submitted early in March; and the comprehensive character of it will have been gathered from the information already in possession of the members of the National Gas Council.

Coal Imports.

The long-term contracts for foreign coal necessitated by last year's coal stoppage have been practically exhausted. In April the amount of foreign coal brought into the country was only 24,685 tons, for which £53,106 was paid.

Coal Retail Prices.

Some of the largest retail coal firms in London are evidently not a little perturbed over the reluctance of domestic consumers to purchase coal at the prices which have been ruling. Doubtless consideration has also been given to the flights in adoption of gas-heating appliances in recent years. A surprise cut in the retail price of coal, varying between 8s. and 12s. 6d. per ton, was announced in London last week. The prices now range from 31s. for stove coal up to 39s. for best brights. It is thought that this big reduction will, by enlarging business, help the coal owners, and enable producing costs to be lowered still further. It is pointed out as being notable that, at a time when the cost-of-living figure is 65 p.ct. above pre-war, good standard house coal can be bought at 37s. 6d. a ton—only 39 p.ct. above the 1913 price of this particular quality.

Engineers' Bill.

In view of the criticism made in these columns when the Bill promoted by the Society of Technical Engineers for the registration of engineers was first published, we are glad to find that it does not commend itself to the engineering institutions. At a recent conference, it was unanimously decided to oppose the Bill, as being inimical to the interests of the public and the engineering profession. A copy of the resolution has been forwarded to the Home Secretary. The Council of the Institution of Gas Engineers are strongly opposed to the measure; and, at their request, the National Gas Council have taken steps to ask Members of Parliament to "block" it.

Illegal Expenditure by Local Authorities.

There has been introduced in the House of Commons the Audit (Local Authorities) Bill, which has for its object the amendment of the law with respect to the effect of surcharges by district auditors, appeals from decisions of such auditors, and the recovery of the sums certified by them to be due. The measure was introduced by the Minister of Health, Mr. Neville Chamberlain. It is another step in the movement to place a curb on extravagant expenditure by local authorities. The Bill gives effect to the decision of the Government that, where illegal expenditure of considerable sums is disclosed, the law should provide for a period of disqualification of the person surcharged for membership of the local authority concerned.

Cost of Electrical Installation.

The Central Electricity Board and Sir Andrew Rae Duncan have had a terrible shock—according to the "Evening Standard" last Wednesday. They have learned that the price charged for electric current in this country is not the only drag on the progress in adoption of that commodity. In the block of offices in which they have established themselves, there is a steam-heating system; and the Board, after deep and serious deliberation, came to the conclusion that this was improper, and that it would only be conforming with the proprieties if they adopted electric heating. They sought an estimate from the supply Company for the installation. When it came along, the figure was somewhat in excess of £100, which the Board considered rather steep. The matter, it seems, has been argued inside out between the Board and the Company, with the result that the steam-heaters are still, on cold days, dutifully keeping warm the members of the Central Electricity Board.

Chemical and Fuel Developments.

It is reported that negotiations are now proceeding between Imperial Chemical Industries, Ltd.—the new British chemical combine—and the German Dyestuffs Corporation for a comprehensive working agreement between the two concerns. It is understood that the negotiations will, in the first instance, apply to questions affecting the dye situation; and it is anticipated that later negotiations will be extended to include a new manufacturing and sales agreement in respect of artificial silk, oil extracted from coal, mixed fertilizers, and other products. A working arrangement has also been effected between Imperial Chemical Industries, Ltd., and International Combus-

tion, Ltd., regarding the development of low-temperature carbonization in connection with powdered fuel firing for steam-raising purposes. It is stated that two large plants—one operating the McEwen-Runge process and the other the "K.S.G." ("Kohlenscheidungs") method—are to be erected.

Non-Political Industrial Unions.

In the coal-fields there is a distinct cleavage of the men in the matter of allegiance to the Miners' Federation and the Miners' Industrial Union—a subject to which we have previously referred. South Wales possesses upwards of 100 branches of the Industrial Union; and the miners can be counted by the thousands who have in Northumberland, Notts, and Derbyshire, attached themselves to organizations whose views are favourable to the Trade Disputes Bill—in the main, if not in every particular. Those who are interested in this development will find good presentation of the ideas favoured by the Industrial Union regarding the new measure by reading the newspaper reports of the speeches made by Mr. George Spencer during the second-reading debate.

Innocent Strikers.

The discussion in Committee of the House of Commons of the mass of proposals for the amendment of the clauses of the Trade Disputes Bill commenced last Wednesday. From the Labour-Socialist side of the House, the old tactics of causing obstruction and interruption, mixed with uncomplimentary remarks, were further indulged in. In connection with clause 1 of the Bill, the Government have undertaken to consider whether a proviso cannot be framed to enact that persons who merely cease work, and take no active part in furthering an illegal strike, shall not be liable to penalty. The Attorney-General, however, asked that there should be no delusion as to the risks of such a provision. To deem persons innocent who participate in an illegality would be a novelty in our law; to exclude them from liability would be to increase the difficulty of proof against the ringleaders. What the Government are trying to find is suitable language which will exempt from liability people who neither incite nor organize an illegal strike, who neither picket nor take other active steps to render the strike a success. We will not deal with the work on clauses in Committee, but will wait for the revised Bill. Meanwhile, the Government are receiving a large amount of testimony that numerous trade unionists throughout the country regard the Bill as one which will restore to them their industrial and political liberty, protect them against extremists, and safeguard their benefit funds.

FORTHCOMING ENGAGEMENTS.

May 20.—BRITISH COMMERCIAL GAS ASSOCIATION.—Manchester District Conference at Buxton.

May 20.—SOUTHERN ASSOCIATION OF GAS ENGINEERS AND MANAGERS.—Visit to the Nine Elms Works of the Gas Light and Coke Company.

May 21.—YORKSHIRE JUNIOR GAS ASSOCIATION.—Visit to the Keighley Gas-Works.

May 21.—SCOTTISH JUNIOR GAS ASSOCIATION (EASTERN DISTRICT).—Annual meeting in Edinburgh. Presidential address of Mr. M. Darling, of Cowdenbeath.

May 25.—EVENING STAR LODGE.—Meeting.

May 25.—WESTERN JUNIOR GAS ASSOCIATION.—Visit to the works of Messrs. Willey & Co., Ltd.

May 26.—MIDLAND ASSOCIATION OF GAS ENGINEERS AND MANAGERS.—Spring meeting at Dudley.

May 26.—SOCIETY OF BRITISH GAS INDUSTRIES.—Annual general meeting and dinner, at the Hotel Cecil.

May 26.—SOUTHERN ASSOCIATION OF GAS ENGINEERS AND MANAGERS (EASTERN DISTRICT).—Meeting at 28, Grosvenor Gardens, S.W. 1, at 2.30.

June 11.—LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.—Visit to the Margate Works of the Isle of Thanet Gas Light and Coke Company.

July 12.—NATIONAL GAS COUNCIL.—Annual meeting at the Hotel Cecil, at 3.15.

Sept. 23.—SOUTHERN ASSOCIATION OF GAS ENGINEERS AND MANAGERS.—Visit to the Torquay Works of the Torquay and Paignton Gas Company.

INSTITUTION OF GAS ENGINEERS.

May 20.—Gas Investigation Committee.

June 13.—Council meeting.

June 14-17.—Annual General Meeting in London.

PERSONAL.

On Monday, May 2, Mr. J. HARGER PYE, Engineer and Manager of the Clevedon Gas Company, was presented with a travelling bag by the Directors, staff, and workmen of the Company, in appreciation of his long and devoted service. Col. S. Keen, D.S.O., who made the presentation, mentioned that Mr. Pye came to Clevedon 27 years ago, and during that time he had greatly enhanced the value of the Company. The good feeling existing between the Directors, staff, and employees was largely due to his good work.

Mr. J. B. SCOTT, third son of the late Mr. J. B. Scott, Engineer and Manager of the Cowdenbeath Gas Company, Ltd., has been appointed Manager of the Corporation Gas Department, Orange, N.S.W., Australia.

Recent elections to full membership of the Institution of Chemical Engineers include Mr. E. D. WHITELOCK, Chief Engineer to Messrs. Brotherton & Co., Ltd., of Leeds; and Mr. J. H. BINGHAM, Works Manager to Messrs. George Glover & Co., Ltd., of Chelsea. There have been elected as associate members Mr. A. J. AMBROSE, Engineer to the Manly Gas Company, near Sydney, N.S.W.; Mr. A. T. GREEN, Technical Adviser to the Derbyshire Silica Firebrick Company, Ltd., Friden, near Buxton; and Mr. W. JOHNSON, Carbonizing Superintendent on Vertical Retort Installations, c/o West's Gas Improvement Company, Ltd., Miles Platting, Manchester.

The wedding has taken place at Eckington of Miss Blodwen Annie Hayes, only daughter of Mr. J. W. HAYES, Manager of the Eckington Gas-Works, and Mr. Tom Greensmith, only son of Mr. J. T. Greensmith, General Manager of the Markham group of collieries. The presents included a pair of antique candlesticks from the employees of the Eckington Gas-Works.

FORTHCOMING RETIREMENT OF MR. A. CADDICK.

Mr. Archibald Caddick, after a long period of strenuous and valuable work as Engineer and Works Manager to the Croydon Gas Company, feels that the time has arrived for him to take things more easily, and acting upon the advice of his doctor he is shortly retiring. This announcement was made with regret, on behalf of himself and his colleagues, by Mr. William Cash, F.C.A., the Chairman of the Company, last Monday evening, when addressing the annual meeting of co-partners; and it was similarly received by the crowded audience. We understand that the event will take place next month.

Mr. Caddick has served the Company for the long period of 28 years—for exactly one-half of this time under the late Mr. J. W. Helps, and for the other half as Chief Engineer. During that time, Mr. Cash pointed out, Mr. Caddick has witnessed a wonderful growth of the Company's business. The works at Waddon have been enormously enlarged; and he has, in very great measure, been responsible for this enlargement. The nature and extent of the latest portions of this work readers of the "JOURNAL" will have realized from an illustrated article, extracted from the "Croydon Co-Partner," which appeared in our issue for April 20 last. He will leave behind him at Waddon a permanent memorial in good work well done.

The past winter, with its manifold troubles and anxieties, proved a great strain upon Mr. Caddick; and all who enjoy the privilege of his friendship will echo the wish of the Chairman and Directors of the Company that his well-earned rest may bring him renewed health and strength.

OBITUARY.

We are sorry to learn of the death, which occurred on the 9th inst., of Mrs. Amy Florence Langford, the wife of Mr. P. N. LANGFORD, Gas Engineer to the Coventry Corporation, with whom much sympathy will be felt in his bereavement. Mrs. Langford was taken ill while on holiday at Easter last year, and though improving from time to time had never fully recovered. Indeed, she had been seriously ill for some time previous to her death.

Yorkshire Junior Gas Association.—On Saturday next, May 21, the Association will visit the Keighley Gas-Works. The time chosen for the inspection is 3 o'clock.

Midland Association Spring Meeting.—The spring general meeting of the Association will be held at Dudley on Thursday, May 26, on the invitation of the President (Mr. Fras. C. Briggs), and of the Chairman and Directors of the Town of Dudley Gas Light Company, who will entertain the members at luncheon at the Dudley Arms Hotel. In the morning there is to be a visit to the Netherton Iron-Works of Messrs. N. Hingley & Sons, Ltd.; and after the general meeting at 2.30, an inspection of the Dudley Gas-Works and a visit to the works of Metallisation, Ltd., to inspect the "Schoop" process of metal spraying. Tea will follow, on the invitation of the Chairman and Directors of the Gas Company.

ELECTRICITY SUPPLY MEMORANDA.

The Unlet Houses.

In the "Memoranda" last week, reference was made to approximately 100 "all-electric" houses which are still unlet by the Liverpool Corporation Housing Committee. According to a report in the "Liverpool Post," 100 appears to be an under-estimate. At the meeting of the Council on the 4th inst., Mr. G. Chadwick moved the reference back of a recommendation of the Housing Committee regarding the removal of certain restrictions to the tenancy of the houses. The idea of the mover was that an inquiry should be made to ascertain how the unlet houses could be made suitable for the people for whom they were originally intended. The admission regarding the larger number of unlet houses was made by Mr. T. White, Chairman of the Committee. He stated that of 250 "all-electric" houses, the Corporation had let 100, but hoped to find tenants for the others. As we said last week, the fact that these houses have had their windows broken cannot be attributed to their being all-electric; but Mr. White, according to the newspaper report, confesses that a certain unpopularity "based on fear from which 'all-electric' houses suffer" has been created very largely by the adverse criticism in the Council. We would suggest that experience in other houses may have had some effect; and people are getting tired of being compelled to use electricity, when other agents are cheaper. The amendment was not carried; but the recommendation to remove certain restrictions was agreed to.

The First Scheme.

The Electricity Commissioners have submitted to the Central Electricity Board the first scheme which they have drafted under the Act of last year. It applies to Central Scotland; but it is unnecessary here to mention the particulars, as they are sufficiently dealt with in the Editorial columns this week.

Popular Gas.

"Meteor," the "Electrical Times" jester, has noticed the nonsense in a certain section of the daily Press regarding the increase in gas bills last quarter, due to the need for paying for the raw material which so largely kept the whole country going with means for lighting, heating, and cooking during the coal stoppage, and to the transfer of custom from the coal merchant to the gas supplier. The jester asks the question: "Apart from the high cost of gas, is it not thoroughly unpopular?" The increased cost "Meteor" knows full well is temporary. The evidence of the recent correspondence is that, in normal times, gas is one of the most popular of domestic agents; and was very much so during the coal trouble. But the public have short memories. Another point is that those who have complained form an infinitesimal proportion of the gas consumers of the country. The unpopularity resides in "Meteor's" imagination. The sales of gas since the first General Electric Lighting Act was passed have increased, in the case of statutory concerns alone, by approximately 300 p.ct. Strange that an unpopular commodity should do this! The patronage does not show coldness, ungratefulness, or hostility to gas. Actual patronage is a greater certificate to popularity than a few complaints are to unpopularity. Our "Spirit of Coal" is viewed by "Meteor" as a "red devil." We have before heard of men seeing such things. Everyone who uses gas (according to "Meteor," who sees nasty things) "is terrified of it." Then why use it? "It has slain friends or relations of those who consume it in every town in the land." We are sorry to find "Meteor" in this state. His friends will assuredly be getting anxious about him if he continues to run wild in such fashion. Despite the little flare-up in the Press, we shall this year get more consumers and a vastly increased connection of gas appliances. Our friend had better prepare himself for the ordeal he will have to face when the facts are published at the end of the year, which facts will add to the testimony of the popularity of gas.

Assisted Wiring Schemes.

The subjects of assisted wiring and "all-electric" houses project largely at the present time from the news items of our electrical contemporaries. There is, however, nothing much that is new to say in connection with them; but a calculation which has been published in regard to assisted wiring at Preston is of interest. The Engineer and Manager of the Gas Company there (Mr. Samuel Tagg) will no doubt have read with some amusement the report of the Corporation Electricity Committee on the subject of assisted wiring. It is stated that there are 70,000 houses in the borough not wired for electricity, which, it is estimated, would yield an additional revenue of £150,000 if electricity was installed. This fact speaks well for the Gas Company; but it also shows that the Electricity Committee are not a little covetous in basing their calculations upon the complete deprivation of the Gas Company of the lighting of the whole of these houses. However, we have no misgivings as to the views of the Company on the question. The Electricity Committee may have their eyes on the 70,000 houses; it is the tenants of the houses who will decide whether or not they transfer their affections from gas to electricity. We have no doubt, too, that the Preston Gas Company, with Mr. Tagg on the defensive, will see to it that the custom of as few as possible of the houses passes from them to the competitors.

Price Reductions.

It is not known whether it is due to the recent little tempest in the newspapers over gas bills that is prompting the somewhat rapid removal of the higher prices which electricity concerns have had to charge in view of the coal stoppage; but the fact remains that recently a number of announcements have been made of the withdrawal of the extra price for domestic purposes. It is also noticed that several intimations have been made of reductions in price by other undertakings, especially in connection with domestic heating and cooking applications. On the other hand, there are concerns which have only lately increased their prices in view of the uncomfortable financial results of the financial year ended March.

Collieries and Electricity Supply.

An interesting article has appeared in the "Sheffield Daily Telegraph" regarding smokeless pits, and the supply of electricity to surrounding districts from the Carlton Main Collieries. The Company have what is known as the Frickley power station, with a capacity of 22,500 kw. The main purpose of the plant is, of course, the supply of the Company's various collieries; and it is clear that, with such a load as the interconnected collieries provide, it is easy enough from the mains which link them together to supply the surrounding villages at very cheap rates. The article states that since March, 1925, the Company have dealt with, under the free-wiring system, about 3000 workmen's houses in the townships of South Elmsall, Moorthorpe, Brierley, and Grimethorpe, and, during the past few months, the service has been extended to Cudworth. The supply is furnished under two methods—the "limiter" system and the "meter" system. Under the "limiter" system, which is applied to cottage property, and is only available for lighting, the charge varies according to the number of lights supplied. For six or more lights, the tenant pays 1s. 6d. per week in winter, and 1s. 3d. per week in summer. For five lights, the charge is somewhat less; and for four or less lights, the tenant pays 10d. per week in winter, and 7d. per week in summer. Under the free-wiring meter system, 1d. is charged for each unit consumed, whether for lighting or other domestic service, *plus* a sum varying according to the number of lights. For six or more lights, 1s. per week is charged in winter and summer; for five lights, 10d.; and for four or less lights, 8d. It is stated that upwards of 200 shops, clubs, offices, public buildings, churches, and large houses have been wired at the expense of the consumer; and in these cases the current is charged for by meter reading at prices which are reduced as the consumption increases. Street lighting has also been undertaken on two housing estates.

Electric Furnaces.

One of the peculiarities about articles published in the electrical papers dealing with the use of electric furnaces is that somehow or other they always contrive to present prices for doing certain work which are just a little less than the figures which they quote for gas furnaces. When the information submitted is sufficient to make a proper analysis of the comparison, it is usually found that extraordinarily high figures are quoted for gas, and with furnaces not representing the most modern, while for electricity low prices are charged, and curiously enough the heat losses are of an order which postulates nearly 100 p.ct. efficiency. Why the heat of electricity should be specially favoured in respect of radiation and so forth is a mystery too deep for us to probe. An article has appeared in the "Electrical Review" on "The Electric Furnace in Industry." In a comparison, electricity is taken at 0·75d. per unit; gas at 2s. 3d. per 1000 c.ft. A table is given which supplies figures for different types of work at per ton of output. One of the items is melting brass. For this, the consumption of gas is put down at 7324 c.ft., costing 16s. 5d.; the electricity consumption at 224 units, and the price 14s., which means that 764,288 B.Th.U. supplied by electricity will do the same amount of work as (taking the calorific value at 500 B.Th.U. per c.ft.) 3,662,000 B.Th.U. supplied by gas! In other words, the suggestion is that, using gas, about five times more heat is required than if the heat is electrically provided. Take another item—annealing brass. It is calculated that 4060 c.ft. of gas would be required per ton of output, costing 9s. 1d.; while, with electricity, 121 units, costing 7s. 6d., would be needed. Here again, the suggestion is that 412,852 B.Th.U. electrically supplied will do the same work as 2,030,000 B.Th.U. supplied by gas. The writer of the article believes that even these electrical figures will be improved upon,

and that the use of electricity for metallurgical operations is destined to increase greatly in the districts where the supply authority is sufficiently far-sighted to appreciate the influence of such a load upon revenue, and able to put into force a tariff which will encourage development. We rather think that before there can be any confidence in this respect our electrical friends had better obtain actual figures with the most modern gas furnaces to compare with what is done in respect of electrical operation. But the writer does make an admission. It is that there are two main obstacles to be overcome before the use of electric furnaces can become as general as gas furnaces. He does not appear to harbour a very flattering idea of the knowledge of electrical engineers regarding metallurgical work. The number of instances is very small indeed of electrical training being combined with thorough experience of the hundred-and-one different trades and processes to which furnaces are applied. He also thinks that there is much to be done in the way of effective publicity before electricity can make any great strides in this particular field.

NATIONAL GAS COUNCIL.

Central Executive Board.

A Meeting of the Central Executive Board of the National Gas Council was held at 28, Grosvenor Gardens, S.W. 1, on Tuesday, May 10. The chair was taken by Sir DAVID MILNE-WATSON, LL.D., D.L.

GAS LEGISLATION.

It was reported that the memorandum which was finally approved by the Board at its last meeting had been lodged with the Board of Trade, with a request that the Council should have an early opportunity of discussing the points raised with the Board.

RATING AND VALUATION.

It was reported that, in accordance with the recommendations made at the last meeting of the Board, communications had been sent to all elected representatives, advising them of the arrangements made by the Council for dealing with this matter.

RAILWAY RATES.

It was reported that, although the Council's appeal from the judgment of the Railway Rates Tribunal, which came before the Court of Appeal on April 27, had not met with complete success, the Council had achieved the objects which it had set out to attain—namely, the safeguarding of the position of the gas industry in connection with future applications for revision of standard charges under section 35, or when standard or exceptional charges are periodically reviewed by the Tribunal under section 59 of the Railways Act, 1921.

COMMITTEE APPOINTED TO CONSIDER TERMS OF REFERENCE TO THE STANDING COMMITTEE ON MINERAL TRANSPORT.

Members were advised that a meeting of the Transport Committee had been held on the 3rd inst., when the question of the terms of reference to the Standing Committee on Mineral Transport as affecting the gas industry was investigated, and particularly the report of the Royal Commission on the Coal Industry—viz., the feasibility and advisability of

(*a*) employing 20-ton wagons for the carriage of coal;
(*b*) promoting the standardization of wagons; and
(*c*) promoting formation of district pools of coal wagons.

It had been decided that a questionnaire should be sent to representative undertakings, and that a further meeting should be held after the returns have been obtained.

STAMP AND OTHER DUTIES IN THE CASE OF RECONSTRUCTION AND AMALGAMATIONS.

It was reported that the Council had made representations some time ago to Lord Colwyn's Committee on National Debt and Taxation, pointing out that the duties payable upon amalgamations were unfair and too heavy, in that they were paid twice upon the same capital. It was now of interest to note that the Chancellor of the Exchequer had recently stated in the House of Commons that he proposed to introduce relief from the burden of the Companies Capital Duty and Transfer Duty, upon the ground that they constituted "an undue obstacle to the healthy amalgamation and reconstruction of companies." This relief will be provided in accordance with the report of the Company Law Amendment Committee, and will be contained in the Finance Bill which will shortly be introduced into Parliament.

It was decided that any question which might arise with regard to this matter should, if necessary, be referred to the Gas Legislation Committee.

ANNUAL MEETING OF THE COUNCIL.

It was reported that arrangements had been made for the annual meeting of the Council to be held at the Hotel Cecil on Tuesday, July 12, at 3.15 p.m.

INSTITUTION OF GAS ENGINEERS.

Provisional Programme.

The Annual General Meeting of the Institution will be held at the Institution of Electrical Engineers, Savoy Place, Victoria Embankment (near Waterloo Bridge), by the kind permission of the Council of that body, on Tuesday, Wednesday, and Thursday, the 14th to the 16th of June, under the presidency of Mr. John Wilkinson, O.B.E., Engineer and Manager of the Nottingham Corporation Gas Department.

The provisional programme (subject to revision) is as follows:

Tuesday Morning, June 14, 10 *a.m.*—Preliminary business. Appointment of Scrutineers for election of officers, Council, members, associate members, and associates. Presentation of the "H. E. Jones London Gold Medal" to Mr. C. H. Rutter, of Brighton. Presentation of Diplomas awarded in 1927 under the Institution's Education Scheme. Election of Presidents of Gas Associations abroad as Honorary Members. Address by the President. Annual report of the Council. Reports of Committees.

Tuesday Afternoon, 3.15 *p.m.*—Presentation of reports of Committees and discussion thereon. Reading and discussion of papers.

Tuesday Evening, 8 *p.m.*—Reception and dance at the Connaught Rooms, Great Queen Street, by invitation of the President and Mrs. Wilkinson.

Wednesday Morning, 10 *a.m.*—Annual general meeting of contributors to the Benevolent Fund. Scrutineers' report of election of members, associate members, and associates. Introduction of newly-elected members, associate members, and associates. Reading and discussion of papers.

Wednesday Afternoon, 3.15 *p.m.*—Reading and discussion of papers.

Thursday Morning, 10 *a.m.*—Reading and discussion of papers. Scrutineers' report of election of officers and Council for 1927-28. Presentation of Presidential Certificate. Concluding business.

Friday, June 17.—Visit to Nottingham, by invitation of the Nottingham Corporation. Opportunity will be given for visiting the Basford Gas-Works, and several manufactories of general interest at Nottingham. Ladies are included in the invitations.

Arrangements are being made for a special train from London to Nottingham and back.

BENEVOLENT FUND.

The Committee of Management of the Benevolent Fund desire the Secretary (Mr. Walter T. Dunn) to call attention to the good work which is being done by means of this fund, in assisting those in need of relief. Widows, orphans, and members, whom misfortune has overtaken, receive grants, the adequacy of which in each case is dependent upon the income available. To provide for the continuance of the payments now being made from the fund, and in view of further applications for assistance, it is essential that the list of subscribers should be augmented.

GERMAN GAS ASSOCIATION.

"Das Gas- und Wasserfach" for April 30 gave the full programme for the sixty-eighth annual general meeting of the Association, which is to be held at Kassel, on June 15 to 17, under the Presidency of Herr Kühne, of the Berlin Municipal Water Undertaking.

A report will be presented upon the present state of the project for centralized gas supply from the Ruhr coke ovens, a subject which has been investigated by a Special Committee of the Association. Dr. Biel will give a paper on internal resistances to flow in gas mains, and Prof. Dr. Karl Bunte will speak on the importance of constancy in gas quality.

All arrangements in connection with the meeting are in the hands of Herr K. Lempelius, Berlin W 35, Lützowstr. 33/36, who is Business Manager for the Association.

North of England Photographs.—With reference to the unique collection of photographs of original members of the North of England Gas Managers' Association published last week, No. 5 was described as "the late T. W. Trewhitt, of Liverpool." This should have been "of Hartlepool." The mistake will have been observed from what followed.

Institution of Civil Engineers.—At the annual general meeting on Tuesday, May 10, the ballot resulted in the election as President of Mr. E. F. C. Trench, C.B.E., M.A., B.A.I. (London); and as Vice-Presidents of Sir Archibald Denny, Bart., Sir Brodie H. Henderson, K.C.M.G., C.B., Sir John F. C. Snell, G.B.E., and Mr. G. W. Humphreys, C.B.E. Other members of Council elected included Sir Dugald Clerk, K.B.E., D.Sc., F.R.S., Mr. S. Bryan Donkin, Sir Robert A. Hadfield, Bart., D.Sc., D.Met., F.R.S., Sir Henry P. Maybury, K.C.M.G., C.B., and Sir Richard A. S. Redmayne, K.C.B., M.Sc.

JOHANNESBURG NEW GAS-WORKS.

Details from Mr. W. R. Herring's Reports upon the Scheme.

It has already been announced in the "JOURNAL" that Mr. W. R. Herring, M.Inst.C.E., was invited to assist the Johannesburg Municipal Council in adjudicating upon tenders received in connection with a scheme for the construction of new gas-works at Cottesloe, and that his examination of the various tenders sent in resulted in his recommending for acceptance the offer of Messrs. Blane & Co., representing West's Gas Improvement Company, Ltd., of Manchester. The outstanding feature of the tenders received was the fact that the British tenders were lower than the German. The complete tenders ranged from £153,160 to £266,968.

The scheme is an interesting one; and we are now in a position to furnish details of Mr. Herring's reports upon it and of his adjudication upon the various tenders submitted (in response to world-wide advertisements), to a specification issued by Mr. B. Sankey, the General Manager of the Gas and Electric Supply Department, on behalf of the Municipal Council.

The present works, supplying nearly 100 million c.ft. per annum, were erected in 1890, and are now taxed to their utmost capacity. The necessity for making provision for an extended supply has long been realized; and in 1919 Mr. H. J. Ibbotson reported upon this, and submitted approximate estimates of cost. But owing to delay in obtaining authorization to raise the necessary capital, it was not until last year that definite steps were taken to get new works established, although a suitable site was secured. The scope of the contract, with certain specific building exceptions, comprises the complete equipment of a modern gas-works, including foundations for plant and all buildings.

The site covers 25 acres, and is situated 1¾ miles from the centre of the town. Provision is made for railway sidings; and the geographical position of the works necessitates buildings and lay-out of the plant to present a pleasing appearance from an architectural standpoint. The nature of the ground is shaley rock of the dolomitic limestone type. Johannesburg is situated 5700 ft. above sea-level; and the range of atmospheric temperature is from 90° to 25° Fahr. shade readings, with a normal barometric pressure of 24·75 in. A suggested lay-out of the plant accompanied the specification; but the contractors were free to modify it within considerable limits. The Council supply water at a charge of 4s. 4d. per 1000 gallons and electric current at 1½d. per unit.

The carbonizing plant was stipulated to be of the vertical retort type, capable of carbonizing 100 tons of coal in 24 hours, and to produce gas of a calorific value of 400 B.Th.U. under Johannesburg conditions of altitude, &c. A coal testing section is provided by isolating a portion of the main carbonizing plant (about 10 tons), but with complete subsidiary plant to enable this station to be used as a fuel testing station for the many classes of coal available in the South African Union.

The works mains were specified to be 24 in. in diameter. The subsidiary plant was required to be equal to 2 million c.ft. per day; and the lay-out permits of an easy extension of the first section of the carbonizing plant. The purifiers provide an area of 0·6 sq. ft. per 1000 c.ft. of daily capacity; and the gasholders comprise two double-lift holders and steel tanks, with provision for adding an additional lift to each. The inner lift of each holder is required to throw a minimum pressure of 6 in.

There follow the usual subsidiary apparatus and incidental particulars necessary for the guidance of the parties tendering for the construction of a completely new gas-works capable of being added to without disturbing the plant now installed. The contractor is responsible for the complete equipment and liable for the successful operation of the plant.

The levelling of site, railway sidings, subsidiary buildings, drainage, and service supplies form no part of the contract, and will be executed locally under the direction of the City Engineer's staff. The distributory system and ancillary equipment is also a thing apart, but is being proceeded with.

EXTRACTS FROM THE REPORTS BY MR. HERRING.

General Remarks.

Experience everywhere shows that gas and electricity are kindred, and thrive side by side in all places where civilized life exists. Where lighting is concerned, in places such as Johannesburg, electricity has no competitor, if for no other reason than that one must have light during the evenings in the warm weather, when further heat resulting from burning gas would be intolerable. On the other hand, temperature charts show that artificial heating must be resorted to for a considerable period of the year, if only for short periods of the day, at times such as the mornings and evenings. For this purpose gas has no rival, as it can be employed instantly and as quickly checked, as contrasted with an open fire or central heating system. It can, moreover, be easily applied to the domestic hot water supply by means of highly economic gas-fired boilers in place of the ones now used for coal, &c.

Its application to cooking and similar purposes in the home is now universal in all climates, and must be much more advantageous in a climate such as Johannesburg enjoys; as even here madam must give some attention to such duties, and, although servants may be willing and plentiful, she must endure the discomfort of an overheated kitchen where the coal range still reigns. Where servants are for any reason absent, gas is a domestic necessity. Gas will also encourage the employment of white labour in the home, and thus help to eliminate the male native from domestic service.

From certain data and statistics, I gather that a large proportion of the gas sold is to business firms—such as hotels, restaurants, printing works, plating and enamelling works, engineering shops, hospitals, tea rooms, biscuit factories, and other trades—who take 75 p.ct. of the present output. This fact alone establishes its utility and economy for such purposes. The next largest users are the residents in the flats, &c.; but the following facts show to what little extent gas is employed, as contrasted with the extent to which it should be:

JOHANNESBURG.

Area	81¾ sq. miles
Population, total	305,440
Population, European only	172,740
Assessable value	£53,000,000
Electricity consumers	31,000
Gas consumers (estimated, owing to many private sub-meters being in use)	1,265
Miles of gas mains	34

I have tried to discover the cause of this; and in my view gas does not appear to have been exploited in days gone by as a commercial proposition, probably under the mistaken belief that electricity could fill its place, and latterly owing to deficiency of plant to meet any increased demand. Experience, however, has proved beyond doubt that such a view is mistaken, and that where an enlightened policy is pursued both prosper alike—the one helping the other. If Johannesburg adopts a forward move in gas supply, the works now contemplated will be only the beginning of something much larger in the near future.

To accomplish it, you must educate your public; and the first necessity is a central showroom, where appliances can be seen and their use explained. Such a central depôt or showroom should also be made the centre of gas supply service, where consumers can make known all their wants to an intelligent staff, and give their orders for all they require. They are also used as receiving offices for payment when the financial department is not otherwise centralized. The central showroom facilitates co-operation with the "trade," who are able to use it by bringing their customers to see the best and latest appliances which they could not be expected to stock on their own premises.

If any further proof is desired as to the possible development of gas consumption in Johannesburg, I may instance Cape Town, where gas is 9s. per 1000 c.ft., *plus* 1s. extra for prepayment meters. Cape Town, with a European population of 112,000, has 6500 consumers, as contrasted with 1250 consumers in Johannesburg, with its larger population.

Site of Works.

In so far as its suitability is concerned, the site is in every way satisfactory; and advantage has been taken of its conformation so to dispose of the plant for the respective processes as to assist greatly in the gravity flow of the liquids used in, and produced as part of, a gas making process.

In so far as the neighbourhood generally is concerned, the Council are to be congratulated in finding a suitable area so well tucked-away as to render the works largely invisible from the residential areas; and as the holders, which are usually the most prominent feature of any gas-works, will be of the "disappearing type"—that is, only visible to the extent to which they are inflated—and, moreover, are to be placed upon the lower level of the site, the trees existing and such as may be planted will almost completely screen these structures.

I understand that some fear has been expressed that a nuisance may arise from the carrying-on of the larger operations contemplated, both by objectionable odours escaping and from smoke and steam. If such fear exists, it is absolutely groundless, as no such trouble can arise from a modern gas-works plant which operates upon the principle of an entirely closed process; and there can be no smoke, steam, or vapours escaping into the air.

Gas-Works Tenders.

Tenders were received from eight different firms. As, however, some submitted alternative proposals, there were in all eighteen tenders; six did not comply with the Council's specification in some important respect; while two were complete, or nearly so, but so much in excess of others for a similar installation that they have not been considered in detail.

The tenders—subject to adjustment—range from £153,160 17s. 0d. to £181,248. The official specification and form of tender issued by the Council was drawn in such a way as to permit of the parties tendering exercising considerable latitude in their proposals, and thus ensure the Council getting the most up-to-date installation, based upon the experience of the respective contractors, all of whom are of world-wide reputation.

Purifiers.

One firm have offered a lower price if the purifier tanks are constructed of reinforced concrete, instead of cast-iron plates with faced flanges. The difference in cost is £5770 in this particular case, but even more when comparing one firm with another. There are a few instances where concrete purifiers have been constructed recently in the Home Country, and are reported to be doing satisfactorily; and the subject is worthy of serious consideration. I have satisfied myself that you have suitable material in the locality, and competent firms who can fabricate it into first-class structures for ordinary purposes.

I am not, however, without further inquiry, in a position to advise at this stage; and the conclusion regarding the tender at which I have arrived is based upon the adoption of cast-iron tanks. Meantime the substitution of concrete for cast iron can be considered.

STATION METER.

Recently in the Home Country the rotary type station meter, as distinguished from the drum type, has been introduced, and very favourably reported upon. It has also come within my own observation. As there is a considerable difference in cost, this is again a question for further consideration.

GASHOLDERS.

Two two-lift frame-guided gasholders were specified; and tenderers were invited to submit alternative specifications for the employment of wrought iron in place of steel sheets in the tanks and floating bells. They were also invited to tender for a tankless holder. The question of wrought iron *v.* steel for structural work of this character is an important one from the point of view of durability. It is well known in the shipping world that a hull plated with iron realizes a better price when sold than a hull of similar age plated with steel. The parties have submitted the necessary information as to the increased cost as applied to the gasholders. It amounts to some £8000, and adds nearly 20 p.ct. to the cost of the construction. After duly considering this matter, both Mr. Sankey and myself are agreed that the increased cost would not justify the proposal. The tankless holder is a new device which, in my view, is still in the experimental stage; and although it is cheaper, I do not feel justified in recommending your adopting this at present.

Alternative tenders were submitted for spiral guided holders. This type is cheaper to construct and also to maintain, as the periodic painting of the framework is dispensed with. There is a difference of nearly £7000 in the cost; and I have no hesitation in suggesting that you should adopt the spiral gasholders, which have the further advantage of being visible to the public only to the extent that they are inflated with gas.

BOOSTER HOUSE AND PLANT.

All tenderers have offered the slow-speed rotary exhauster type for this purpose; but in my view it is not suitable for what you require. Its construction is such that it will produce a pulsation in the gas mains and in the consumers' supply. I am therefore of the opinion that the turbine type should be substituted.

EXTERNAL GAS PRODUCERS FOR COAL.

The objective underlying this proposal is (*a*) to save the coke otherwise used in the heating of the retorts (about 12 to 15 p.ct. of the amount produced) and make it available for sale; and (*b*) to recover an additional quantity of tar to the extent that coal is employed in place of coke for this purpose. I fully appreciate the great importance of tar to the economy of your undertaking, and deal with the subject at a later stage. I will therefore now only deal with the merits of the proposal to apply such a plant for the heating of the retorts.

The installation cost of a plant of this character is variously stated by the different parties at from £10,000 to £15,000. The operating costs are also a matter for consideration. I am thoroughly acquainted with this type of plant as applied to gas-fired boilers, and recently had through my hands a large installation in Scotland. Its purpose is to enable bituminous coal or coal refuse to be used as fuel, and to permit of the recovery of the bye-products, tar and ammonia. In the particular case mentioned, during a 100-hour test, using nearly 200 tons of coal, there were yielded 17 gallons of tar and 84 lbs. of sulphate of ammonia per ton of coal; and the gas gave an efficiency of over 90 p.ct. in the boilers. The practical character of the proposal, therefore, is proved; but as applied to the heating of the vertical gas retorts, with their intricate combustion chambers consisting of honeycomb channels of brickwork, it is another matter.

I would expect some difficulty in obtaining clean dry gas under the conditions prevailing in Johannesburg, owing to the difficulty in reducing the gas below 60° Fahr.; and if the gas contained oil or tarry vapours, it is certain that sooner or later the gas ports, channels, and combustion chambers in the retort settings would become affected by a carbon deposit. Moreover, the quantity of heat required for the gas installation is comparatively small, and will not, in my view, justify the capital expenditure involved, or the manipulating costs which such a plant necessitates. Whether or not it is worth your while considering the application of fuel gas to the firing of the steam boilers at the power station is another matter, and it might be well to investigate.

BYE-PRODUCTS RECOVERY.

Bye-products recovery in the process of gas manufacture forms a very important part in its economic administration. In England, 75 p.ct. of the cost of coal is usually recovered for the coke, tar, and ammonia. In Johannesburg, I find that in 1926 you recovered for coke and tar 126 p.ct. on the cost of coal, &c.; and I understand it is safe to estimate for a return of 1s. per gallon for tar. In so far as ammonia is concerned, the high cost of sulphuric acid renders the production of sulphate of ammonia uneconomic; but provision has been made for producing a concentrated liquor ammonia such as is used for refrigerating, laundry, and other purposes, and for which I understand there is a market in South Africa. In 1926, coke realized 50 p.ct. of the cost of coal, and will represent about the same price per ton sold from the yard as coal cost delivered into the yard. You may therefore calculate that this relationship will continue.

THE SCHEME CONSIDERED.

In considering the tenders submitted by the respective parties and the official specification and proposed lay-outs, I have necessarily been forced to consider the scheme on its merits in regard to the stipulated requirements of the Council. In this respect, I can express my approval of the original proposals by Mr. Sankey, and of the more detailed proposals by the respective tenderers, who have necessarily had to modify the lay-out to suit their particular types of plant. They have all made full provision for the complete equipment of a modern gas-works.

There is an important difference in the conditions under which gas manufacturing operations are carried on at an altitude at which the barometric pressure is some 17½ p.ct. below the normal in the Home Country. Only one of the contractors, however, has laid stress upon the fact that, in designing his furnace work, &c., due regard has been given to this point. Another fact which has a very important bearing upon the cleansing of the gas to make it suitable for treatment for the recovery of ammonia and its proper purification is the temperature of the water that can be obtained for cooling the gas in the condensing plant. I have ascertained that the temperature is more often above 60°, and up to 70°, in the water mains; and it is necessary to bring the gas down to a temperature of 60°, or preferably lower, in order to precipitate the oily matter suspended in it.

INSPECTING THE TAR SEAL OF A WATERLESS HOLDER.

The "Gas Age-Record" informs us that the Pacific Gas and Electric Company have recently brought into operation in Oakland a 10 million c.ft. waterless holder. This huge structure will always be prominent in the landscape, being no less than 301 ft. high, and 218 ft. diameter. It will never vary the monotony of its size by sinking its head; and it has been labelled "Fuel Bin for East Bay Cities." The article is descriptive of the compressor plant to be used in connection with the holder, and the arrangements which have been made for the daily inspection of the tar seal, radial guide rollers, &c. This latter provision emphasizes the point we have frequently made as to the greater supervision which is necessary with the waterless type of holder. In the first place, an electrically operated four-passenger elevator cage has been installed within the holder to permit access to the piston, and the motor driving the cables of the elevator has been erected in a steel house on the roof, from which, having regard to the height, a fine view can be obtained of the country around. The *modus operandi* is as follows: "When a workman desires to descend to the piston, he enters the motor house, and throws a switch, then proceeds along a hatchway provided on the top of the roof, and passes into a penthouse, descending a series of metal stairs which leads directly into the passenger cage. After entering the cage and properly closing the door, he presses a button which starts the motor which lowers the cage to the top of the piston, thus giving easy, quick, and safe access to the piston." That is interesting; so is this: "At the point where the cage comes to rest on the top of the piston, there has been installed a special telephone by means of which the workman may communicate with the operator in the compressor plant. This elevator is used by an operator several times daily in descending to the top of the piston for the purpose of checking the tar seal, and for inspecting the radial guide rollers, &c." This throws instructive light on the views of American engineers as to the necessity for great watchfulness over the working of this type of holder.

Mercury from Coal Tar.

Mention was made in the "JOURNAL" of May 11 of the fact that Dr. F. W. Aston had contributed a letter to "Nature" in which he dealt with the isotopic constitution of mercury derived from coal tar. Mr. W. Kirby, B.Sc., of the South Metropolitan Gas Company, had furnished a sample of the mercury, which appeared in the lightest of the fractions distilled, and occurred to the extent of about one part in seven millions of undistilled tar. Dr. Aston obtained a number of mass spectra, in which the groups of isotopic lines were indistinguishable from those of ordinary mercury. In a note published in "Chemistry and Industry," Mr. Kirby explains that the Company operate continuous stills; and when these stills are dismantled for overhauling, it is a customary experience to discover in "pockets" in the coil of the light-oil condenser quanties of free mercury. The quantities of mercury now recovered are larger than mentioned above; averaging one part of mercury from one-and-a-half million parts of tar. The mercury is deposited in a bright untarnished condition; but if it is not removed for long periods, it is then usually discovered associated with variable quantities of mercuric oxide. Mr. Kirby suggests that the source of the mercury is possibly cinnabar as an impurity in iron pyrites or dispersed as such in the coal substance, or it may be present in the coal associated with bituminous matter such as idrialite.

The Plassmann Low-Temperature Process.—According to a recent issue of the "Yorkshire Post," the patent rights of the Plassmann Low-Temperature process have been secured for this country by the Leeds Fireclay Company, of Wortley; and at the moment there is in course of erection the first of a battery of eight Plassmann ovens each capable of dealing with 50 tons of coal a day.

GAS BOILERS FOR DRYING KILNS.

Successful Installation in a Sports Factory.

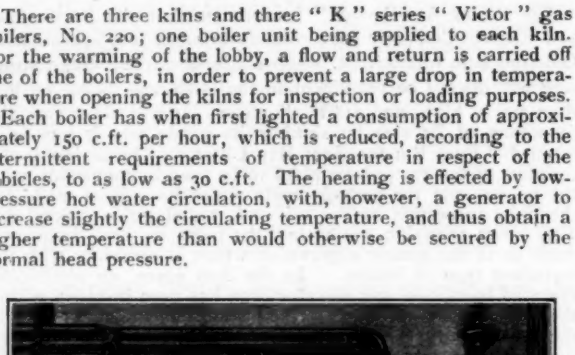
An interesting and successful application of gas industrially is to be found in the Deodar Road Works, Putney, of Messrs. A. G. Spalding & Bros., Ltd., who are makers of tennis racquets, golf clubs, &c.

The timber for these sportsmen's articles is unloaded from barges on the river front; and owing to the varying atmospheric conditions, it is found to be considerably charged with moisture at certain times of the year. However, by a process of slow and progressive heating the elimination of moisture from the wood is effected without case-hardening the material. This slow and progressive heating is secured with the utmost reliability by means of a gas-heated plant applied to the drying kilns.

BATTERY OF "VICTOR" BOILERS.

There are three kilns and three "K" series "Victor" gas boilers, No. 220; one boiler unit being applied to each kiln. For the warming of the lobby, a flow and return is carried off one of the boilers, in order to prevent a large drop in temperature when opening the kilns for inspection or loading purposes.

Each boiler has when first lighted a consumption of approximately 150 c.ft. per hour, which is reduced, according to the intermittent requirements of temperature in respect of the cubicles, to as low as 30 c.ft. The heating is effected by low-pressure hot water circulation, with, however, a generator to increase slightly the circulating temperature, and thus obtain a higher temperature than would otherwise be secured by the normal head pressure.

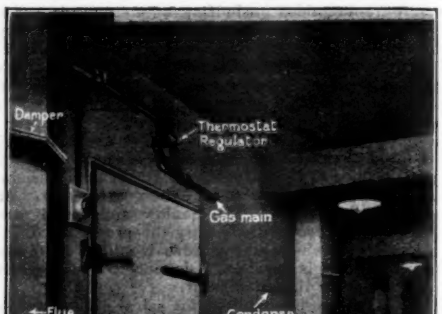


Boiler Plant in Basement showing a Battery of Three "K" Series "Victor" Boilers No. 220.

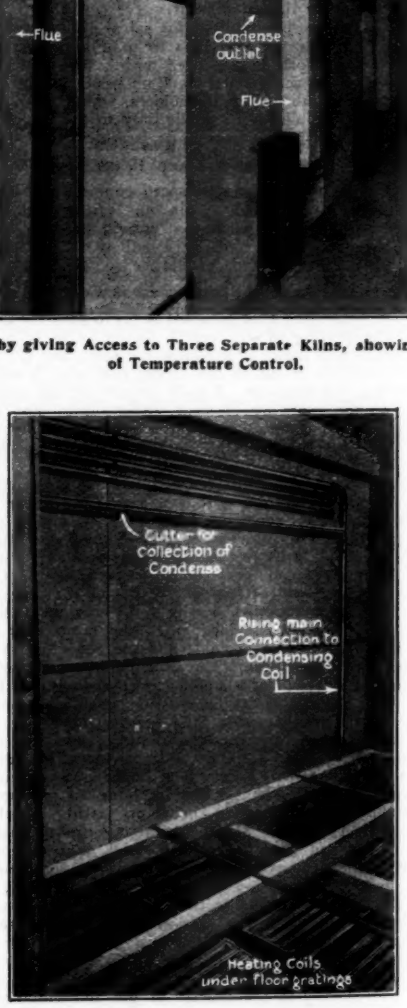
THE PROCESS OF DRYING.

To obtain the effect desired, the temperature inside the cubicles is gradually worked-up as the wood begins to dry, commencing at 80° Fahr.; and by the aid of the thermostatic regulators, on which a dial with indicator is provided, a slight increase day by day is secured in the internal temperature, until 140° Fahr. is reached. Confirmation of the temperature conditions is always possible by a reading of the thermometers, which are visible from the exterior. Thus a gradual and progressive heating is afforded; and the necessity is avoided of opening the doors to prove the result. After reaching the maximum temperature required, it is essential that the heating effect should be reversed in order to cool-down slowly before exposing the finished product to the external atmosphere. A simple method of indicating the moisture and condition of the air is rendered available by the provision of a long coil of cold water main pipe, which is carried along the side wall of each kiln. On this water pipe condensation occurs; and the water is drained into a gutter which passes to a small outlet into the lobby, where it is collected in a suitable vessel. The progress of drying is thus shown; and when the outflow ceases entirely the highest temperature can be reached and the final shrinkage and re-cooling effected.

The boiler plant is situated in the basement, immediately under one of the kilns, which are constructed in a separate building inside the factory. The building is made of strong framing, packed with slag wool and lined with Uralite and beaded, thus forming effective non-conducting material; while for the air change a duct is taken from the exterior, passing through the coil, and entering through the floor, with suitable means of control for variation. As an outlet, a vertical duct



The Lobby giving Access to Three Separate Kilns, showing Means of Temperature Control.



The Interior of a Kiln with Perforated Floor Grating Lifted showing Heating Coils.

is provided in the angle of each kiln, with an opening about 18 in. above the floor, and a damper in the wall of the lobby, whereby the requisite variation to meet the requirements can be easily made.

This special application of the gas-heated boiler has been carried out by the firm of Thomas Potterton, of Cavendish Works, Balham, London, S.W.

Gas in Commercial, Institutional, and Home Laundry Work.—Issue No. 158 of "A Thousand-and-One Uses for Gas," published by the "B.C.G.A.," gives particulars of the appliances used in modern commercial and institutional laundries—large, medium, and small—and shows that the much-needed revolution which has taken place of recent years in the equipment of such institutions is almost entirely due to the extensive adoption of gas.

THE GAS INSTITUTE OF NEW ZEALAND.

THIRD ANNUAL MEETING.

The Third Annual Meeting of the Institute was held at Wellington from Feb. 9 to 12, under the presidency of Mr. M. J. KENNEDY, the General Manager and Secretary of the Wellington Gas Company, Ltd.

The annual report states that the membership of the Institute now totals 67. Of the 47 gas undertakings at present operating in the Dominion, 42 are represented by one or more technical officials on the roll of the Institute.

As a result of representation to the Minister of Justice, an Order-in-Council dated June 21, 1926, was passed, adding the following chattels to the 7th Schedule of the Chattels Transfer Act, 1924—namely, equipment, apparatus, and appliances for use in connection with the consumption of coal gas.

PRESIDENTIAL ADDRESS.

Mr. KENNEDY, in the course of his Presidential Address, remarked that the technical Press has played a very important part in the growth of the gas industry—notably, the "GAS JOURNAL" and the "Gas World." The publications, he said, are most useful, and should be in the hands of every gas manager.

Important developments have taken place in the method of carbonization. In the case of Wellington, horizontal retorts were replaced by the intermittent Dessau system. Some four years ago, Glover-West verticals replaced the Dessau plant. The unqualified success of the Glover-West system has been conclusively demonstrated.

A second unit of the latest design for steaming is now in course of erection at Miramar. When completed, the carbonizing plant will have a daily capacity of 4 million c.ft. The Glover-West system has been largely adopted; and in the Dominion installations are at work at Napier, Palmerston North, Wellington, and Timaru. The City Council, Dunedin, have also decided to adopt this system.

Waste heat recovery is a feature of the Wellington installation. The whole of the steam necessary is raised from the heat contained in the products of combustion after completing the work of carbonization within the settings. The waste-heat plant consists of six boilers, which are of local manufacture. The boilers are provided with "Thermo-feed" regulators, which automatically maintain the water level in each boiler. Altogether the system of waste heat recovery has proved a decided success.

The Wellington Gas Company was founded in 1869. Gas was first supplied to consumers on April 22, 1871. The sales for 1926 totalled 539 million c.ft. The consumption has increased from 250 millions in 1907 to 539 millions in 1926. It has increased 100 p.ct. in 18 years. The capital of the Company in 1870 was £10,000. In 1926 it was £547,000.

It has been stated in the Dominions that gas is sold at lower rates by municipal gas departments than by gas companies. The reason for this is not very hard to find. During the past six years the Wellington Gas Company has paid the following amounts:

	£	£
Government land and income-tax	83,170	
Government annual licence	1,200	
Government stamps for gas receipts	2,184	
		86,554
City Council—		
Rates	8,840	
Royalty on gas used in certain areas	4,825	
Other annual charges	1,401	
		15,066
Total		£101,620

The average per year is no less than £17,000.

The amount paid in income-tax by the Auckland Gas Company during the past five years amounted to the large sum of £135,417, or a yearly average of £27,000.

Municipal concerns and Power Boards are exempt from these heavy charges; and it would be well, in making comparisons, to bear these facts in mind. Some years ago a Taxation Commission recommended that all municipal and Government trading concerns should be placed on the same footing in the matter of payment of income-tax as private companies; but so far nothing has been done. The present taxation system is most unfair; and it is to be hoped the Government will soon have this remedied.

Electric Power Boards also receive special advantage in the matter of Customs duties, as will be seen from the following:

	Gas. P.Ct.		Electric. P.Ct.
Cookers	25	..	20
Burners	20	..	10
Engines	15	Motors	Free
Cast-iron pipes	20	Cables	Free

PREPARATION OF ROAD TARS BY THE LEAD BATH PROCESS.

By W. O. R. GILLING, M.A., B.Sc., (N.Z.), of Christchurch.

Actual operation of the "T.I.C." plant manufactured by the Woodall-Duckham Company has shown that it can easily dehydrate ordinary modern gas-works tar. The plant is guaranteed to remove 5 p.ct. of water, and up to 10 p.ct. of oils, at a temperature of 230° C. from the crude tar, with an output of 20 tons per day. The full output has not been strained after, having averaged 15·4 tons per day. If anything, more than 10 p.ct. of oil has been removed, since the consumption of the crude tar has differed with variation in carbonizing methods. Consequently a higher tar temperature has been found necessary. Even so the tests of the prepared tar have revealed a slight deficiency of middle oils, particularly in the earlier months of operation. When the middle oil was increased, by lowering the temperature of the tar at the outlet of the still, the consistency suffered; and as this latter factor is of greater importance, we were content to revert to the first condition of things. For all practical purposes, consistency commends itself to a civil engineer more than does the middle oil fraction.

As a result of our experience at Christchurch, it has been found necessary to alter some small items in the arrangement of the plant. With the heat exchange operating between the vapours and the ingoing crude tar, it was found that there was a tendency to "priming," with consequent irregularity of flow of the crude tar into the still. The alteration made was to pass the ingoing tar through a small coil of pipe immersed in the top portion of the condenser tank; the latter being cooled with water suitably adjusted. Heat economy was thus effected without "priming."

Another source of trouble was that, with a fairly long supply pipe from the crude tar well, the tar pump did not always function regularly. To obviate this, a small tank was erected nearby at a height of about 30 ft., into which the tar was pumped instead of into the still. An overflow pipe returning to the well ensured a full head of tar, which was then fed by gravity into the still through a regulating cock. The feed into the still was thus made much more regular and reliable.

ADVANTAGES OF THE PROCESS.

The following advantages have been claimed for the plant:

1. Rapid and uniform heat transmission from furnace to tar; local or uneven heating impossible.
2. No accumulation of carbon on bottom of still to affect the heat transmission.
3. Elimination of fire risks, and of priming, by the use of only a thin film of tar.
4. Possibility of treating with perfect safety tars containing up to 50 p.ct. of water.
5. Flexibility and easy control of temperatures.
6. No complicated parts; maintenance costs low.
7. Lead in still unchanged in value, even after years of working.
8. Compactness, small dimensions, and entire freedom from noxious fumes, to the satisfaction of the Alkali Inspectors of Great Britain.

In connection with item 7 above, it has been alleged against the process that any sulphuretted hydrogen in the crude tar will attack the lead, and reduce its value. The answer of the manufacturers is that, though this might be expected, it does not occur, and the lead remains clean. The reason for this would seem to be found in (1) the relatively high temperature of the lead, (2) the thinness of the tar layer, (3) the short time of contact of tar with lead. The sulphur compounds are removed so rapidly from the vicinity of the lead that the latter is unaffected.

Experience at Christchurch with this type of still has shown that it is extremely efficient, easy to run and to control, and very reliable. The product has been maintained fairly easily within the prescribed limits, and the amount of attention required when working is small. The cost of operation is not excessive, and the plant is peculiarly suited to those gas-works which desire to dehydrate their own tar. One weakness suggests itself—that too much reliance is placed upon the tar pump in the control of the working. Even our present modification is not ideal. On the other hand, the advantages claimed seem to be fully realized; and it is my privilege to record the fact.

WATER-GAS PLANT ON A SMALL WORKS.

By J. W. BLACKMAN, Masterton Corporation Gas-Works.

About the year 1922 the position in the gas industry was that there had been for the past few years a steady rise in the costs of materials, labour, &c., in connection with the manufacture of gas, and there was the definite prospect in the near future of keen competition from the Government hydro-electric scheme, which it was manifest would take a proportion of our

business. Some method had to be evolved by which the costs of gas manufacture could be reduced.

The first proposal considered was the installation of vertical retorts. This was fully and carefully investigated, and turned down. I then devoted my attention to blue water gas plant. Having no relief holder available, it was necessary that the plant selected should run for 24 hours, which at that time, with any standard plant, meant three operators' wages, and in addition the interest and sinking fund charges on a capital cost of at least £5000. In this case the increased labour costs would have largely nullified any advantage gained by the installation.

It was about this time that Mr. Lowe read his paper on the automatically controlled blue water gas plants installed at Auckland and Devonport. I recommended to my Council that a full investigation should be made into the working of this system. It was ultimately decided to instal one of these plants, and at the same time machinery for emptying coal from the trucks into the store.

The plant, which was manufactured and erected by the Steel Construction Company, of Auckland, has a capacity of 200,000 c.ft. per day, which was reduced to suit our requirements by increasing the thickness of the firebrick linings. The plant has proved extremely flexible—more so than might have been expected, in view of the comparatively small output of water gas required—the amount of water gas being easily adjusted to the output and the C.V. of the coal gas.

At present we are not burning the blow gas under the producer arches of the retort settings; only one setting as yet being connected up. When the arches are re-set, the necessary connections will be made from the blow-gas main, which runs at the back of the bench for the full length thereof, and then turns into the main flue. When all the furnaces are connected-up, I anticipate an increase in the amount of coke available for sale. The sales of gas in 1926 were only 152,000 c.ft. in excess of the previous year. The actual amount paid for coal for 1926 was £2782 less than the previous year. The cost of running the plant was £718. The loss of revenue from decreased production of coke and tar was £819. The net saving was £1245, largely attributable to the water gas plant. The results would have been better but for the abnormal percentage of unaccounted-for gas due to the condition of one of our gasholders, which has since been re-sheeted.

From experience with this plant, I am satisfied that the problem of B.W.G. plants for works of comparatively small output has been successfully solved. The success from a financial point of view is almost entirely due to the fact that the costs of manual control have been eliminated.

MODERN GAS-WORKS ACCOUNTANCY.

By W. H. Cattell, of Sydney

I have prepared a brief outline of a method by which consumers' accounts may be kept mechanically, even by a small undertaking. Obviously it is out of the question to entertain seriously the installation of many machines in a small works; but if you can save time and get the figures quicker, you are losing by not having the equipment installed. Time saved is money saved; and it is unfair to the business to have a man doing work by hand which can be done quicker, better, and cheaper by a female operator with a machine.

I refer particularly to female operators, because ladies are especially suitable for this type of work. You will agree that girls rarely seek employment with the idea of making their chosen vacation a permanent career. For this reason they rarely attain the higher positions in the management, and in fact it is infrequent that they desire this. They are generally content to remain in positions where the work is largely of a routine nature; and their contentment ensures a steady flow of neat and accurate work.

In adopting an office machine, it is necessary that the first one particularly should be of all-round application. There is one note of caution I would sound. Do not take your present system and try to fit a machine to it. Instead, it is preferable by far to select (on proper advice) a suitable machine for the work under consideration, and then to rebuild the work around the machine, taking full advantage of the various possibilities of the latter.

I will outline briefly a system for the keeping of consumers' accounts.

Meter readers to read and render accounts in duplicate or triplicate. If the triplicate system is used, the original, with the duplicate attached, is left with the consumer. The third copy goes to the office, and the information on it is posted by a suitable ledger posting machine (after being scrutinized and checked by rental clerk) to the consumer's card in the card ledger. These cards are kept in street order, with a progressive reference number. The gas consumed and the cash debits are also summarized separately on an adding machine, and the totals on this adding machine must agree with those on the ledger posting machine. The daily totals and the balances, being kept progressively, give the information of sales to date, and the whole position at a glance.

The ledger posting machine may be merely an adding (listing) machine fitted with a few keys to type-in brief outlines of reference, or may be a typing machine with adding devices attached. Both kinds are in extensive use. Each has distinctive claims, but I have a leaning towards the more adaptable typing machine variety.

The essential feature is that each ledger card is kept in perpetual balance; and the accumulation of the total of the day's debit and credit postings furnishes instant proof of the arithmetical accuracy of these postings. The slight possibility of posting to wrong accounts is a negligible item.

On payment of the account, a cash register machine can usefully be employed by printing the receipt, recording reference number, identifying receiving cashier, and if required, for indicating to which ledger or section the amount received in each case is to be credited, with a dissected summary. The cashier retains the duplicates of the gas bills, and these are handed to the rental office for posting by machine to the credit side of the ledger cards. At the end of the day, the amounts so posted to the credit of consumers' accounts will be shown on the ledger posting machine, and will agree with the total shown on record sheet from cash register. Before the ledger posting machine can be cleared to zero, the daily balance figures must be transferred to a clearance card, which the accountant should examine daily to satisfy himself of the correctness of all postings.

Records of coin meter transactions can readily be kept on similar cards to those used for ordinary meters, as the final records deal with similar features. It is preferable, however, to use cards of different colour, or with distinctive markings, for this purpose. With the coin meter collection it is impracticable and unnecessary to print the individual receipts through the cash register, but each collector's summary can usefully be passed through it for record.

If the triplicate form of account is not used, duplicates only being preferred, the original can be left with the consumer. On payment of the account, the posting to credit side of card is done from cash register record only. This prevents the posting being done at several times during the day, as one does not like to be continually extracting the cash register records. It seems that the use of the triplicate system is becoming general, as it has the advantage of greater flexibility in operation.

The other sales can be recorded by the ledger posting machine; but again distinctive cards should be used. The purchases of stores, &c., can also be handled by the same machine, and every account dealt with in the same way. The effect is that each day can yield its own proved progressive figures, showing precisely the financial position.

No reference to calculation work would be complete without mention of the slide rule, which is certainly wonderful for engineering and approximate answers. In ordinary office work it is the custom to determine accurately figures for which only approximate answers are required and necessary. Much time and effort are lost in this direction which could be effectively saved by instructing the members of the clerical staff in the use of the slide rule. I have met office staffs where even the females were quite expert in its use. There seems to be a big field for greater employment of slide rules in gas-works offices; and I commend this to your consideration.

GETTING NEW AND HOLDING OLD CONSUMERS.

By J. J. Rogers, of Auckland.

We must provide ample pressure for our peak load—a drop in pressure, even for a short time, is sufficient to retard the preparation of meals by the housewife, and is preparing the ground for an electric salesman. Mains, services, and meters of ample size to provide sufficient gas at a constant pressure for consumers' requirements must be provided, where necessary, as quickly as circumstances permit. A carefully thought-out scheme for improving reticulation is much better than spasmodic attempts done in emergencies. If possible, do not wait until consumers complain. Carry out work before the trouble arises, and win the respect and good-feeling of consumers.

To be sure our consumers are getting good results from the gas purchased from us, it is necessary for us to know that the burners are properly adjusted and in good order. In Auckland, our whole district is divided into sections, and a man is kept in each section visiting every house once in three months. He attends to the meters, testing them for registration, watering, &c., and where possible cleans the burners of all appliances and adjusts same, and sees that the consumer is satisfied. Should the pipes be choked or further attention be required, he reports same on his daily report sheet; and the attention necessary is given. We try to find a fault, if such exists, before the consumer is aware of it.

A maintenance man has more opportunities of establishing a good feeling between consumers and company than any other man in the gas service. The very nature of his work brings him into closer contact with the consumer in his district, and while doing his work he has ample opportunity to answer questions and give information about the use of gas. The consumer's good impression of the maintenance man is most valuable to the company, and he can frequently induce a consumer to purchase more appliances. In 1926 we sold 313 gas cookers

through our maintenance staff. Reading, maintenance, and selling could, in some cases, be done with advantage by the same man.

All salesmen must understand the goods they sell, and there is a great need for some method of educating our gas salesmen. We are sadly handicapped for want of this. Men trained to gasfitting usually lack the personality, tact, and initiative necessary for selling, or lack the true perspective of service. A promising youth put into the application and meter reading department, then a year or two in the gasfitting and maintenance, passing on to the sales staff, should have the experience to make a good salesman.

Probably in the near future our present system of charging for gas will have to be revised. It has been found necessary in America, where the conditions in both industries are more alike than in Britain, to adopt community, service, demand, and other systems of charging—some of them as wonderful, weird, and confusing as electric systems.

MEASUREMENT OF HIGH PRESSURES.

A Lecture at the Imperial College of Science and Technology.

The second of a series of eight lectures upon high-pressure gas research was given at the Imperial College of Science and Technology on Friday, May 13, by Mr. D. M. Newitt, Ph.D.—the subject being the "Measurement of High Pressures."

In his opening remarks the lecturer pointed out that the purpose of measuring pressures and recording pressure changes in a gas reaction is usually to follow the progress of the chemical change or to estimate the amount of energy absorbed or liberated during that change. Numerous types of gauge are available for the purpose; the selection of the most suitable instrument being determined by the character of the reaction under investigation and the magnitude of the pressures involved.

The measurement of static pressures presents no great difficulty, provided certain precautions are observed; and reliable commercial gauges can be obtained for pressures up to 3000 atmospheres or thereabouts. Since, however, most of these gauges depend for their action on the elastic deformation of a metal tube or diaphragm, a practical limit is reached when hysteresis effects began to introduce large and incalculable errors. For accurate work gauges of this type required frequent calibration, especially when new and not thoroughly "seasoned;" and it is therefore advisable to include in the equipment of a high-pressure laboratory one or more absolute gauges permanently installed for this purpose. Various designs of absolute gauges were discussed, and their methods of use explained and illustrated.

For measuring the pressures developed in high-pressure gas explosions a special type of gauge is required to give a continuous record of the changes of pressure from the moment of ignition until the explosion is complete and the hot gases have partly cooled. As the time interval for such explosions is extremely small, being in some cases less than 1/500 second, and the pressure changes in this interval are very large—say, of the order of 2000 atmospheres—a gauge combining both sensitiveness and mechanical strength is essential. Prof. Bone and his collaborators have employed in their researches on gaseous explosions a number of gauges of the Petavel type designed to reduce "lag" to a minimum and to give continuous pressure-time records free from vibration. The moving element in this type of gauge consists of a heavy steel tubular spring, fixed at one end and acted upon by the pressure at the other end. The slight alteration in length of this tube is magnified and recorded photographically on a rotating film. One such gauge for recording pressures up to 1000 atmospheres was exhibited at the lecture, and the method of calculating the dimensions of the tubular spring for any given range of pressures was indicated.

In conclusion, a brief description was given of a number of secondary pressure gauges in which use is made of the variation with pressure of certain easily measurable physical properties.

The next lecture of the series will be given on Friday, May 20, and will deal with the design of high-pressure plant and equipment.

SOCIETY OF CHEMICAL INDUSTRY—CHEMICAL ENGINEERING GROUP.

ANNUAL GENERAL MEETING.

The Annual General Meeting of the Chemical Engineering Group of the Society of Chemical Industry was held in the Staff Common Room of the Imperial College Union, South Kensington, London, on Friday, May 6—Mr. F. H. ROGERS (Chairman of the Group) presiding.

HON. SECRETARY'S REPORT.

The Report of the HON. SECRETARY (Mr. H. Talbot) on the work of the General Committee of the Group for the year ended December, 1926, showed that the year had been a successful one. The membership at the end of the year was 447, compared with 430 at the end of 1925.

The outstanding event in the Group's work during the year was the Congress of Chemists held in London under the auspices of the Society of Chemical Industry and with the co-operation of the General Committees or Councils of the sixteen allied bodies which had co-operated.

The members of the General Committee of the Group had assisted in the organization of the Congress, and the then Chairman of the Group (Mr. C. S. Garland), who was also Chairman of the London Section of the Society of Chemical Industry, had presided over the deliberations of the principal Executive Committee responsible for the details of the congress. The Committee, in the report, expressed their high appreciation of the excellent results accruing from the arduous duties devolving upon Mr. Garland and the members of the Executive Committee and the special committees associated with him.

Of the Group's activities, special attention was directed to the conferences on fuel subjects in which it had taken part. Reference was also made to the Fuel Section of the Society, which was formed last year, and of which Mr. Talbot is one of the Joint Hon. Secretaries. The Section, it was stated, was advancing with rapid strides, and was likely to become one of the most important branches of the Society's activities.

The maintenance and extension of the Group's relations and its joint meetings with other societies was also the subject of comment, and it was pointed out that the greater spirit of co-operation which was becoming apparent among scientific and technical workers was initially of advantage to those concerned, and must ultimately react beneficially upon the nation's industrial progress.

Thanks were expressed to the Council of the Society of Chemical Industry for the assistance they had extended to the Group. The Committee recorded their thanks also to the Assistant Secretary, Mr. Mackie, and the staff associated with him for their help in carrying on the work of the Group during the year.

It was reported that five data sheets were almost ready for issue by the Data Sheet Sub-Committee, and it was regretted that it had not been possible to complete any of these for printing during 1926.

It was announced at the meeting that Mr. Talbot, who has been Hon. Secretary of the Group since its inception, had tendered his resignation, owing to the demands upon his time in other spheres. The members took the opportunity to express to him their gratitude for his great work on behalf of the Group. Prof. E. C. Williams, Prof. J. W. Hinchley, Mr. F. H. Carr (President of the Society of Chemical Industry), and Mr. F. H. Rogers (Chairman of the Group) all paid tribute to his work

The report was adopted.

FINANCE.

The accounts were presented by Mr. H. J. Pooley (the Hon. Treasurer), and showed an excess of income over expenditure of £11 1s. 2d. An item of interest on the income side of the account was a contribution of £26 5s. from the Gas Light and Coke Company towards the expenses of the Fuel Conference held in Sheffield.

The accounts and balance-sheet were adopted, and a hearty vote of thanks was accorded Mr. Pooley.

MEMBERS OF COMMITTEE.

Major V. F. Gloag, Mr. P. Parrish, Mr. D. Rider, Mr. H. Talbot, and Mr. A. J. V. Underwood were elected to fill the vacancies on the Committee.

OFFICERS.

The following officers were appointed by the Committee to serve during 1927-28:

Chairman—Prof. E. C. Williams.
Hon. Treasurer—Mr. P. A. Greene.
Hon. Secretary—Mr. H. J. Pooley.

Mr. Rogers was unable to accept the Chairmanship for another year, owing to his business commitments; and the members of the Group expressed to him their thanks for his services during the year. Thanks were also accorded Mr. Pooley for his services as Hon. Treasurer during the past year, and for having accepted the post of Hon. Secretary; and to the Group Committee.

MIDLAND JUNIOR GAS ASSOCIATION.

THE MIDLAND JUNIORS AT THE FOLESHILL WORKS, COVENTRY.

About seventy members of the Midland Junior Gas Association visited the Foleshill Works of the Coventry Gas Department on Saturday, May 7. On arrival at the works they were welcomed by Councillor Batchelor (Vice-Chairman) and Mr. P. N. Langford (Engineer and General Manager), and were then conducted round the works under the guidance of the following members of the staff: Messrs. Lord, Aveline, Watson, Sutherland, Penn, Head, Thrasher, and Tabberer.

THE FOLESHILL WORKS.

No. 1 Section.

The horizontal retort house has a capacity of 4¼ million c.ft. per diem, and contains 32 settings, each of eight retorts, heated on the Klonne regenerative system and operated by two electrically driven Fiddes-Aldridge simultaneous stoking machines.

Coal is discharged from railway wagons by hydraulic tipping rams, and passes through a crusher and thence to two tray conveyors which feed two gravity bucket conveyors traversing the whole length of the coal stores and retort house. The crusher is driven by a 50 B.H.P. steam engine, and the conveyors by 20 H.P. electric motors; the necessary speed reduction in the case of the conveyors being obtained by means of chain gear boxes manufactured by the Coventry Chain Company. Each conveyor is capable of handling 40 tons of coal per hour. The coal stores have a capacity of 5000 tons.

Coke Handling Plant.

Coke is quenched in cages in the retort house cellar, and is then discharged into wagons which are conveyed by a wire rope haulage system to the gantries, for tipping into the coke yard. The haulage system is driven by a 30 H.P. Crossley gas engine situated in an engine room in the base of the retort house. Two sunk docks accommodate railway wagons for loading. Coke is broken and sized in four breaking and screening mills driven by steam engines. The washing plant comprises elevators and reinforced concrete hoppers, and two mechanically operated washing units.

There is a cyanide recovery plant operated on the Williams' process, for the production of ammonium sulpho-cyanide liquor.

No. 2 Section.

The vertical retorts are of the Glover-West type, and consist of 9 settings each containing eight retorts; the whole having a nominal capacity of 2¼ million c.ft. of straight coal gas per diem. Each setting is provided with a separate boiler for the recovery of waste heat. Two retort house governors regulate the exhaust on the gas collecting mains.

The coal store is a reinforced concrete structure of a capacity of 2500 tons. The main gravity bucket conveyor traverses a subway beneath the stores, and coal from the latter can be fed to it through a series of shoots and a travelling filler. The coal handling plant consists of a rotary wagon tippler driven by a 5 H.P. electric motor, a coal crusher, and two gravity bucket conveyors capable of handling 50 tons of coal per hour. Wagons are hauled by an electric capstan. The coal crusher and cross conveyor are driven by a 28 H.P. electric motor, and the main gravity bucket conveyor is driven by a 12 H.P. electric motor. Speed reduction in the case of the conveyors is obtained by means of Coventry Chain Company's chain gear boxes. The crusher pit is constructed in reinforced concrete.

Coke Handling Plant.

Coke from the retorts is discharged into wagons which are transported by an electric telpher either to the coke screens or to stack. The breaking and screening plant is electrically driven, and produces large coke and four other sizes of this fuel. Railway wagons and carts are loaded direct from the storage hoppers. The washing plant consists of three 5-ton per hour mechanically operated units. The sized coke from the screening plant is elevated to the storage hoppers in wagons by the telpher.

No. 2B Section.

There are under construction five settings of Glover-West vertical eights. The throughput per retort is 5 tons a day, and the total capacity will be 3½ million c.ft. a day.

General Plant.

The benzole plant comprises a Davidson and Liversedge vertical washer with stills and auxiliary plant for the production of crude and refined products, and deals with the gas from the horizontal and vertical retorts. A "Simplex" steam heated vaporizer at the outlet of the benzole plant supplies a mixture of paraffin and naphtha to the gas, to eliminate naphthalene troubles.

The power house contains the following plant:

Two Bryan-Donkin steam driven exhausters, each of a capacity of 160,000 c.ft. per hour. Two turbo exhausters of the Rateau type, each of a capacity of 240,000 c.ft. per hour, driven by 60 H.P. Brotherhood steam turbines. Two 75 B.H.P. Crossley gas engines direct coupled to two 45 KW. Siemens dynamos generating D.C. at 220 volts. Two 56 B.H.P. Crossley gas engines direct coupled to two 32 KW. General Electric dynamos generating D.C. current at 220 volts. One small gas engine and air compressor for starting gas engines. One motor driven dynamo generating current at 240 volts, for charging electric power storage battery. One horizontal tandem hydraulic pressure steam pumping engine capable of delivering 150 galls. of water per min. against a pressure of 750 lbs. per sq. in. This supplies power for operating wagon tippers, hauling capstans, and lifts. Two vertical high-speed steam driven air compressors by Alley & McClellan, each capable of compressing 275 c.ft. of free air per min. to 100 lbs. sq. in. These are used for "air-lifting" water from the works borehole, which is 325 ft. deep, into the main works supply tank.

There are four Lancashire boilers fitted with forced draught furnaces. The feed water is heated by a Berryman exhaust steam heater. All boilers are fitted with superheaters.

There is a Kennicott water softening plant capable of treating 120,000 galls. per diem.

Water Gas Plant.

The generators are of the Humphreys & Glasgow type, and consist of two sets each of a capacity of 900,000 c.ft. per diem of carburetted water gas; and one set of a capacity of 1¼ million c.ft. per diem of blue water gas, now being converted to a C.W.G. set of capacity 1½ million c.ft. per diem.

The engine house contains the following: Two Bryan-Donkin steam driven exhausters, each of a capacity of 60,000 c.ft. per hour. One Bryan-Donkin steam driven exhauster of a capacity of 80,000 c.ft. per hour. Two Sturtevant blowers, each driven by a 30 H.P. De Laval steam turbine. One Sturtevant blower driven by a 55 H.P. De Laval steam turbine.

There are three Lancashire boilers fitted with "Turbine" furnaces and superheaters. The relief holder has a capacity of 100,000 c.ft.

For driving gas from the holders at Foleshill to those at the Gas Street Works, the following plant is in use: One 300 H.P. turbo booster of a capacity of 1,000,000 c.ft. per hour, and a Rateau booster of a capacity of 600,000 c.ft. per hour driven by a 65 H.P. Brotherhood steam turbine.

There are two holders, each of a capacity of 1¾ million c.ft.

Chemical Works.

Sulphuric acid (B.O.V.) is manufactured in a chamber plant; the spent oxide being burned in Wyld's mechanical burners. The oxides of nitrogen required in the process are produced in

an ammonia oxidation plant; platinum gauze being the catalyst. Concentrated acid is made in a cascade plant. Sulphate of ammonia plant is installed capable of producing approximately 6 tons of salt per diem. Dehydrated tar is produced in a Wilton plant.

At the conclusion of the inspection the visitors were entertained at tea by the Gas Committee.

Mr. C. F. TOOBY (President of the Association, and Engineer of the Foleshill Works) said how much the members appreciated the presence of Councillor Batchelor and Mr. Langford.

Mr. H. R. HEMS proposed a hearty vote of thanks to the Coventry Gas Committee, and coupled with the vote the names of Councillor Batchelor, Mr. Langford, and those members of the staff who had acted as guides. He had been impressed by the spaciousness of the works and the excellence of their planning. The members were specially interested—particularly after hearing Mr. Tooby's presidential address—in the bacteria beds for the treatment of effluent.

Mr. W. J. PICKERING (Birmingham), in seconding the vote, said that the visit had been an outstanding success. He congratulated the Coventry Gas Committee upon the fine lay-out and organization of the Foleshill Works. He remembered a visit the Association paid to Foleshill in 1906, when the Engineer was the late Mr. Fletcher Stevenson. Like the Foleshill Works, the Midland Junior Gas Association had not stood still during the intervening period.

Councillor BATCHELOR, in reply, said that Coventry was proud of its gas-works, which, he thought, might be regarded as a monument to the engineering ability of the late Mr. Fletcher Stevenson. Mr. Langford was an Assistant when the works were first erected, and he had proved a very worthy successor to Mr. Stevenson. In Mr. Tooby they had an Engineer of whom the gas industry might be proud. Councillor Batchelor said he looked upon the Junior Associations as a big asset to the gas industry.

SCOTTISH JUNIOR GAS ASSOCIATION (EASTERN DISTRICT).

Two prize-winning papers were submitted at this meeting. Mr. G. E. H. Keillor dealt with the "T.I.C." tar dehydration and bitumen mixing plant at Dunfermline, which, occupying only 10 sq. yds. of ground space, turns out 350,000 gallons a year. The paper is full of practical information, and leaves one in no doubt that trouble taken with tar is well repaid not only to large undertakings. It is noteworthy that Dunfermline send a load of hot tar daily thirty miles by road. The other paper was by Mr. Johnston, in which he gave results of tests of a Cochran gas-fired boiler, and explained how the boiler may be converted to coke firing.

A Meeting of the Eastern District was held in Dunfermline on Saturday, May 7, at which the papers read were those submitted in competition for prizes of £3 and £2. The PRESIDENT (Mr. DARLING, of Cowdenbeath) was in the chair.

THE "T.I.C." TAR DEHYDRATION AND BITUMEN MIXING PLANT AT THE DUNFERMLINE CORPORATION GAS-WORKS.

By G. E. H. KEILLOR.

The "T.I.C." tar dehydration plant is now in its third season's working at the Dunfermline Gas-Works. The plant installed by the contractors includes a still, heat-interchanger, fractionator, feed pump, and auxiliaries such as dial thermometers, water separating pot, foul gas seal pot, &c. In addition, they supplied us with a bitumen melting pot set in the waste gas flue, two mixing tanks, and an air blower. The whole outfit is housed.

The still consists of a shallow cylindrical steel pot, 5 ft. 3 in. in diameter, with a dished bottom and the usual tar and vapour connections. It is set in firebrick over a breeze furnace, and the whole is enclosed in a steel casing lined internally with Moler brick and earth. A small feed pump draws cold crude tar from either of two small feed tanks, which we fitted up as auxiliaries. These are calibrated and fitted with indicators to show the amount of tar being fed. Thence the tar, after being preheated in a heat-interchanger, passes to the still.

The still is partially filled with lead, to cover the highest part of the bottom by 3 in. or so when the lead is all melted. The total weight of lead used is 54 cwt. Half immersed in the lead is a form of "labyrinth," to guide the flow of tar over the surface of the lead. The tar is discharged at the periphery of the still through a chute, the lip of which is ⅜ in. above the lead level, so that there is never more than a few gallons of tar in the still at one moment. Consequently there is no trouble from priming or frothing, with the attendant fire risks. A perfectly even flow of tar is obtained at a throughput of 20 tons of crude tar per day.

The lead performs several useful functions. It acts as a cushion between the furnace and the tar. It balances-up small fluctuations in the firing or flow of tar. It conducts heat rapidly and uniformly away from the still bottom, and prevents overheating, distortion, or burning of the still. This advantage is still more pronounced in view of the fact that, as no tar is in contact with the heated still surfaces, no coke can form thereon to prevent heat transference and impair efficiency. As a matter of fact, a slight coking takes place on the surface of the lead; but this is easily removed once or twice in a season through the manhole on the still cover.

The prepared tar passes through a **U** seal at the still outlet, where are situated the bulbs of an indicating thermometer and of a thermograph. The latter has only been in operation a short time, but is a wonderful help in maintaining a steady temperature, and therefore a steady quality of tar. Thence the tar passes to storage or mixing tanks.

The vapours are taken from the still top and are led to the bottom of the fractionator. This is simply a vertical water-cooled condenser. Here a light creosote is condensed out, and runs to a coil in the tar preheater, where it is finally cooled. In a similar manner the water and light oil vapours are condensed and cooled after passing out at the top of the fractionator.

We work the fractionator at a temperature varying from 105° to 135° C. according to oil requirements. Such temperatures ensure that no water falls down with the creosote oil. The lower end of the light oil and water coil is led into a separating pot, and thence the light oil and water are conducted by separate pipes to storage.

BITUMEN MELTING AND MIXING PLANT.

The installation of a bitumen melting and mixing plant was decided soon after the order was placed for the tar plant; and the decision has been fully justified by the full and profitable use to which this plant has been put. It has enabled us to meet the different demands of our customers for tar-bitumen mixtures varying from 5 p.ct. up to 40 p.ct. bitumen.

The bitumen melting pot is heated by the waste heat from the still, supplemented as required by heat direct from the still furnace by means of dampers. This is an important point, as one fire serves the double purpose of heating the still and melting the bitumen, resulting in considerable economy in working. When making 40/60 tar/bitumen, it is necessary to supplement the waste heat by use of these dampers in order to get sufficient bitumen melted.

The pot has a capacity of 120 gallons per melt, and gives three melts per shift with our standard quality of bitumen—penetration 65. The hot bitumen is run direct to the mixing tanks, entering these very close to the inflow of hot tar direct from the still. The mixing is thoroughly completed by agitation with compressed air. We have not had a single complaint of bad mixing, and are perfectly satisfied in every way with the system.

It is important that the bitumen be raised to at least 200° C. before being mixed with the prepared tar, as only thus can a good mixture be obtained. If the bitumen is not kept to approximately this temperature, there is a possibility of its cooling before mixing is completed. Then, of course, the results are clots of bitumen mixed with thin tar. We also believe that it is important to run-in the tar and bitumen together at the same point, or else spread over the same area. By a sensible arrangement of all cocks on bitumen or tar pipes, and intelligent working of same, it is possible to avoid any blockages. Trouble from this cause is now almost unknown on our plant.

The two original mixing tanks are each of 1000 gallons capacity, and we have ourselves converted two old Cornish boilers, each of 2500 gallons capacity, for the same purpose. These tanks are fitted with steam coils and blower pipes. The mixture is either barrelled direct from the tanks, or pumped to railway tanks. We have also filled road tank wagons, and are so situated that this can be done by gravity. In fact, in all our barrel handling operations no lifting is necessary; the barrels finally being rolled off a loading bank on to motor lorries.

ROAD TRANSPORT.

We find it a great convenience in many ways to deliver by road. We are able to get a return load of empties each run. This reduces the total number of barrels required, as they are not left lying about the roadside for weeks, but are returned at once for re-use. The barrels are also better treated, as our own contractor has all the handling of them. Again, we often save the surveyor or quarryman fuel and time by sending the tar out hot each day as required. At present we have one daily

load going nearly 30 miles by road, simply because in this way it arrives hot.

Working of the Plant.

As regards the working of the plant, one man per shift attends to all the work involved in the making and storing of Road Board tar and tar-bitumen mixtures. His duties include firing, fetching fuel and removal of ashes, filling of bitumen pot, regulation of feed and supply pumps, and, of course, the maintenance of a steady line on the thermograph. He also writes up a report sheet, making hourly entries of temperatures, tar throughput, bitumen run, times fire cleaned, fuel used, and into which tank the tar is running.

Fuel, barrelling, coopering, repairs and maintenance, steam raising, cartages, and interest charges are additional items to bring into the costs; but a figure of 1d. per gallon covers them all.

Since we took over from the contractors we have not had a tenth part of the trouble and anxiety usually associated with tar plants in general, and patent continuous plants in particular.

The quality of the dehydrated tar is regulated by the temperature at which it leaves the still, and this in turn is regulated by the speed of the feed pump. While we get a fairly steady line at this point on the thermograph, we believe it might be perfected, and accordingly have accepted an offer by Arca Regulators, Ltd., to instal their temperature control on our feed pump. They hope to improve considerably on our existing hand regulation of the feed pump.

Wear and Tear.

As regards wear and tear, after a season's working the labyrinth required renewal and the still itself showed signs of corrosion and/or erosion round the sides of the tar level.* We are now using "Armco" metal for the labyrinth, and commenced this season with a new still bottom having the important addition of a narrow "Armco" wearing ring welded on the inside at tar level. We expect a longer life from this part.

The corrosion of the labyrinth and still has been put down to the effect of the hot tar acids. Consequently we have altered the run of the tar inside the still, on the maker's advice, so that the hottest tar is confined to the centre of the still, thus preserving the still shell and wearing ring. Likewise the discharge chute from the still, where the tar is hottest, is now made in cast iron in place of mild steel.

In fairness to the makers of the plant, I must state that this slight trouble is possibly due to the nature of the Dunfermline tar, and is unknown in other plants. Owing to the use of wearing plates and the altered labyrinth arrangement, we have no fear about future upkeep costs, realizing that they have been negligible to date, and will be even less in future. It is interesting that rustless steel stands up to these conditions without a sign of pitting. To give you an idea of the small cost of these replacements, I might say that a new "Armco" labyrinth costs us about 7s. 6d. *plus* the cost of making up, and will last out two seasons' working, or a throughput of 700,000 gallons of crude tar.

We also renewed the bottom of the bitumen pot for this season, and, in the light of experience gained, hope to double the life of this item. However, these repair items are very light, considering that an annual throughput of 350,000 gallons of tar is obtained.

Our laboratory equipment for testing the tar includes Hutchinson viscometers; and there is a pentrometer for testing the deliveries of bitumen. We supply Road Board tar at from 16 to 60 seconds viscosity, and bitumen mixtures at from 25 to 70 seconds viscosity as required. Our light oil averages 0·925 sp. gr., and light creosote 0·974 sp. gr.

Satisfying Consumers.

We give a good measure of service to our customers, and closely study their requirements. There are very few places where our tar has been used which we have not visited personally, to make sure that our products were giving satisfaction. Such attention sometimes enables us to offer suggestions which are of mutual benefit to buyer and seller alike. During the coal stoppage, we supplied a considerable quantity of dehydrated tar to local manufacturers for boiler firing, and used some on our own works, also for this purpose, with satisfactory results.

In conclusion, I cannot help remarking on the increased revenue thus obtained for this department. I would remind you—and this is important—that it is not gained without considerable extra pain and conscientious supervision on the part of the works staff and management. We have been able, partly due to the steady working of the plant, to maintain a satisfactory and uniform product, second to none (according to some of our customers) and conforming closely to the Road Board Specification. Who then shall say it is not possible for small plants to turn out a satisfactory road tar? We in Dunfermline believe it is possible, in view of our experience of the past three seasons.

* The corrosion was above the lead level, so that the lead was actually performing its duty of saving the still bottom from the effects of overheating or local heating.

Discussion.

Mr. Duffy (Dundee) asked questions relative to the flexibility of the plant.

Mr. Smart (Dunfermline) said it would be interesting to the members to learn that the plant was most compact, and occupied only 10 sq. yards.

Mr. Richmond (Penicuik) asked whether, in the mixing process, there was any difference in the sp. gr. between the compressed air and the mechanical methods.

Mr. Keillor, in reply, said he was glad Mr. Smart had referred to the compactness of the plant, which was certainly very small for its job. There was no difference in sp. gr. in the mixing methods.

The President then asked the members to accord to Mr. Keillor a hearty vote of thanks for his paper.

A COCHRAN CONVERTIBLE GAS OR COKE FIRED BOILER.

By W. S. Johnston.

When I promised to give this paper, I intended to carry out further experiments on the Cochran gas fired boiler in our works. Circumstances prevented my doing so, with the result that this paper in a sense is incomplete. However, if desired, at some future date I may be able to give a complete account of my experiments.

Some data regarding the design of the boiler may be of interest. Instead of being the usual single-run type of cross-tube boiler, it has three runs. This is done by dividing the flue boxes into two, and causing the flue gases to travel from the back to front, front to back, and then from back to front before entering the chimney. The boiler has three openings into the combustion chamber—one for stoking with solid fuel, and two for firing the gas burners.

When the boiler is fitted for gas firing, the top of the grate (a "Turbine" furnace grate) is covered with a sheet of asbestos board. On top of this is placed a layer of firebrick cemented with fireclay. This in turn is entirely covered with refractory brick, in pieces of from 2 in. to 2½ in. This refractory is heaped up to within about 6 in. of the combustion chamber crown. An airtight plate is bolted to the front of the ashpit, and the stoking hole is covered by a plate having in its centre an explosion door. The burners are bolted into position. These are 4 ft. long and are fitted with interchangeable spuds and air-shutters. Retarders are placed into the top set of tubes. The gas pressure is raised to 5 or 6 lbs. per sq. in. by a belt driven rotary compressor running at about 150 R.P.M. The power to drive the compressor is supplied by an electric motor.

The gas used is blue water gas of an average of 260 B.Th.U. calorific value, which gas is surplus to our requirements for coal gas dilution.

The boiler is also fitted with an automatic "Thermo-feed" which keeps the water level practically constant. This does away with the necessity for an attendant to look after the feed pump; and as no stoking is required, the question of labour is eliminated.

The boiler is capable of evaporating 2500 lbs. of water per hour using 12,600 c.ft. of 300 B.Th.U. gas per hour. The feed water should be at 60° Fahr. to attain this figure. These figures are for a lagged boiler. The feed tank is supplied from the main by means of a ball cock, and also from the condensing apparatus of our sulphate of ammonia plant.

The gas supply is controlled by a cock on the pipe leading to each burner. A small pressure gauge between the cock and the burner gives sufficient indication of the gas being used.

A 24-hour test was run, of which the following is a summary:

Test	1	2	3	4
Time	5 p.m. to 9 p.m.	10.15 p.m. to 2.15 a.m.	3 a.m. to 7 a.m.	7.15 a.m. to 11.15 a.m.
Compressor pressure, lbs. per sq. in.	7	5	4	3½
Burner pressure, do.	6	3	2	2
Air shutter open turns	⅜	L.H. ½ R.H. ⅜	2	¾
Gas used, c.ft.	52,560	45,970	39,530	12,080
Therms	136·92	119·75	102·98	31·47
Gas per hour, c.ft.	13,140	11,492	9,882	3,020
Therms per hour	34·23	29·94	25·75	7·87
Water evaporated, lbs.	7,810	5,675	4,415	1,850
Water evaporated, lbs. per therm	57·04	47·4	42·7	60·04
Feed temperature	42	42	44	45
Average steam pressure, lbs. per sq. in.	106	104	104	88
Thermal efficiency (corrected)	78·9	66	56·7	75

Average C.V. during this trial = 260 B.Th.U.

Later we ran the boiler daily for a week, for about 8 hours per day. Towards the beginning of the week we were troubled with dust and oil, but at the end of the week the boiler was

running with no trouble. The following figures are the results of a number of snap tests taken each day:

—	1	2	3	4
Compressor pressure, lbs. per sq. in.	7	6	5½	7
Burner pressure, lbs. per sq. in.	6	6	5½	6
Gas used, c.ft. per hour	11,860	14,300	13,600	12,400
Water evaporated, lbs. per hour	1,700	2,200	2,100	1,800
Boiler pressure, lbs. per sq. in.	80	70	81	80
CO_2 in flue gases	18·4	19·2	19·0	..
C.V. of gas, B.Th.U.	258	267	271	248
Lbs. of water evaporated per therm	55·55	57·62	56·98	58·53

All these figures are slightly low for evaporation; but the boiler is not yet lagged, and during the daily tests the steam pressure had to be kept down to 80 lbs. per sq. in., owing to the safety valve blowing-off at 85 lbs. Since then a new safety valve has been fitted, but no further tests have been carried out.

By making the boiler convertible to solid fuel, the efficiency is inevitably reduced below that obtained from one designed entirely for gas firing.

For solid fuel firing, the boiler is fitted with a "Turbine" furnace grate. We tried to run the boiler on coke, but unfortunately we discovered that there was little pull on the flues, and that the products of combustion were difficult to get away. As there were so many right-angled turns to negotiate, the gases were retarded too much for efficient working. To eliminate this fault, passageways will have to be cut between the flue boxes, making the boiler a single run type. These passageways will have to be made so that they can be blocked when using gaseous fuel.

The experiments on this boiler are interesting from the point of view of using a gas of low calorific value for power. Unfortunately there are many difficulties in the way of experimenting on a large scale. If, however, a gas undertaking with a large industrial centre near at hand could supply a low calorific value gas to that centre, and boilers such as I have described were installed, it would no doubt have far-reaching results. There is practically no labour attached to such a boiler. Fuel is in no way wasted. Steam can be raised in a warm boiler in from 20 minutes to half-an-hour, and the boiler can be completely shut-down and left safely in 10 minutes from the time of shutting-off the gas. There is no question of banking the boiler fire for the night; and if the demand for steam is dropping, the gas supply is shut down immediately, so that just enough heat is supplied to give the amount of steam required. Combustion is perfect.

During our tests, analyses of the flue gases gave a CO_2 figure of from 19 to 20 p.ct. Given a clean, constant calorific value gas no trouble whatever is experienced in running the boiler.

I have not yet been able to draw up a comparison of costs, as we have not managed to run the boiler on solid fuel; but from what I have done I am fairly confident that the figures for gaseous fuel would compare favourably with those for solid fuel. With a solid fuel boiler a man is constantly in attendance for stoking. The boiler takes longer to raise steam. If the demand drops, and a good fire is going, steam banks up, and the safety valve blows-off. The stoker opens his furnace door, and cold air in great excess rushes in, thus wasting fuel. At the end of the day the fire has to be either banked or drawn, and more fuel is wasted.

With the gas fired boiler, on the other hand, as the demand drops, a touch on the cock reduces the gas supply, and so no fuel is wasted.

In closing, I should like to thank my Chief, Mr. Dickson, for giving me access to the data regarding this work, and for the interest he has taken and the help he has given me in my experiments. My one regret is that I have been unable to complete them, and so give you more comprehensive notes about them.

Discussion.

Mr. SCOBIE (Dunfermline) suggested that the inlet temperature was low.

Mr. KEILLOR asked what was the temperature of the feed water, and of the waste gases. It was a great mistake to leave the boiler unlagged; and he was sure that better results could be obtained by increasing the draught than by altering the run on the boiler. Were the figures given for evaporation worked from and at 212° Fahr.? He considered that at present there was little hope of these boilers making much progress. Until the rates for industrial gas had been revised, manufacturers simply could not adopt them. In Dunfermline they had a new scale which was as low as 4d. per therm. He was quoting Mr. McIsaacs, of Glasgow, when he said that the price would require to be as low as 3d. or 4d. per therm.

Mr. GAVIN (Kirkcaldy) agreed with Mr. Keillor that it was better to increase the draughts than alter the run.

Mr. JOHNSTON, in regard to price, reminded the members that the experiments were not yet complete, and they had not yet arrived at any financial conclusions. The measurements of evaporation were from and at 212° Fahr.

A vote of thanks was accorded Mr. Johnston.

Following the meeting, the members adjourned to Bruce's Restaurant, where they inspected the extensive gas equipment there.

UTILIZING GAS ENGINE EXHAUST.

In the "Engineer" for April 15 there was an article by Prof. G. Cook, of the University of London, entitled "A Determination of the Efficiency of an Exhaust Gas Boiler." The boiler was constructed by the Clarkson Thimble Tube Boiler Company, Ltd., and was fitted to an 18 B.H.P. Crossley gas engine installed in the engineering laboratory at King's College, London. A series of tests was carried out in order to obtain the efficiency with varying amounts of water flowing through the heater. The engine, running on town gas, was maintained at constant power, speed, mixture strength, &c., for all the tests; the observations common to them being:

B.H.P. of engine	18·3
Speed	262 R.P.M.
C.V. of gas—gross	503 B.Th.U.
net	457 ,,
Weight of exhaust gas	3·23 lbs. per min.
Temperature of exhaust gas leaving engine	1050° Fahr.

The efficiency of the boiler increases as the amount of water passing through increases. When the water was raised to boiling-point, and steam was just formed, the fuel gas temperature was 310° Fahr. In the useful range the efficiency of the boiler was between 79 and 82 p.ct.

A test under the above conditions was made, in which the jacket water of the engine was used as feed water to the boiler. The quantity of water heated was 9·12 lbs. per minute, from 132° to 208° Fahr. The efficiency of the boiler was 83 p.ct.

Two tests were carried out to investigate whether the boiler, by imposing back-pressure on the engine, impaired its efficiency. It was found that with the boiler there was no measurable difference in the consumption of gas, but that the air consumption was greater by 1½ p.ct. This showed that, if any back-pressure was caused, it did not continue till the end of the exhaust stroke. It indicated, on the contrary, the existence of a negative pressure over that portion of the cycle where the opening of the admission valve overlays that of the exhaust. The effect of the boiler is to increase the capacity of the exhaust system, which is favourable for good scavenging.

Developments in Rumania.

A recent number of "L'Usine" gives the interesting news that, in order to assist the development of the gas industry in Rumania, it is proposed to form a Society whose objects shall be the sale and installation of gas appliances. It will also undertake maintenance work. There would appear to be a large potential field of business in that country.

"Evening Star" Golfing Society.

Members of the "Evening Star" Golfing Society had a most enjoyable meeting last Wednesday at the Shirley Park Golf Club. The weather was perfect; and those who were able to attend were favoured by the presence of the W.M. (W.Bro. Fred. G. Cockey), though he himself did not compete. In the morning, a Medal round was played for the Davis Challenge Cup; and a most popular win was registered by W.Bro. A. H. Henry with a score of 78 (93—15). Bro. T. Carmichael, last year's winner, was the runner-up, with 81 (92—11). The afternoon Bogey competition resulted in a tie between Bro. Carmichael and W.Bro. F. C. Tilley, who returned 4 down. Subsequently the W.M. took the chair and presented the cup and prizes; and a hearty vote of thanks to him terminated a most pleasant meeting.

Gas-Works Residuals Make Tennis Court.

At their Staines Works, the Gas Light and Coke Company have a tennis court constructed of gas-works residuals. The principal product used for this court (patent No. 26,221) is oxide and tar covered by a thin layer of sand. The court was laid on made-up ground (1 ft. 6 in. deep) over three years ago; and since then, though playing has been continuous summer and winter, it has needed no attention except for occasional renewals of surface sand. The lines are of reinforced concrete. Mr. J. Neath, the Resident Engineer at Staines, informs us that the points worthy of note in this class of court are: Watering and rolling are not needed, and no dust rises. Weeds will not grow on it, and it is not affected by frost. It is not slippery or tiring to the feet. The balls and clothing do not get soiled as much as with the usual red brick courts. It is advisable after (say) two years' wear to spray or paint the court lightly with hot tar, and at the same time to spread a thin layer of sharp sand over the surface. Mr. Neath recommends the material for the construction of garden and foot paths.

The late Mr. J. E. C. Lord, Managing Director of Messrs. J. E. C. Lord (Manchester), Ltd., tar distillers and manufacturing chemists, left £127,441.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Glasgow Corporation Chemical Works Department.

Sir,—Mr. MacLeod's letter which appeared in your last issue (*ante* p. 383) illustrates to some further extent his interpretation of accounts, and also the method which he has adopted in the preparation of his comparative figures.

For example, he states that "£245,606 would be regarded by most people as quite a satisfactory annual return on a capital of £350,000;" but seeing that the £245,606 *includes* the market value of the whole of his crude tar and ammonia, which value the Corporation Gas Department would, of course, receive even though the chemical works did not exist, the statement is meaningless.

I do not propose to make any further comment—the comparative figures from "Field's Analysis" quoted in my previous letter are not disputed, and your readers will be able to judge whether or not I was justified in describing Mr. MacLeod's figures as misleading.

Francis Tudsbery.

Lime Wharf Chemical Works,
Falkirk,
May 16, 1927.

Power Efficiency Exhibition.

Sir,—At a special Directors' meeting held this morning, it was unanimously felt that, although a large measure of support had been accorded the above project, it was not sufficient to warrant proceeding with the venture; and it was accordingly postponed until a future date.

We thank you sincerely for the practical interest you have shown in the proposed exhibition.

We feel sure that you will agree that, unless a really representative display of power plant can be staged which will attract the right class of attendance, it is better to abandon the Exhibition altogether at the present time.

Textile and Industrial Exhibitions, Ltd.,
Frank Nasmith,
Director and Manager.

121, *Deansgate,*
Manchester,
May 10, 1927.

REGISTER OF PATENTS.

Grill Burners.—No. 268,948.

Main, R. & A., Ltd., and Aird, K., both of Grosvenor Gardens, S.W. 1.

No. 7792; March 20, 1926.

No. 15,684; June 22, 1926.

This invention is for a method of revolving the grill burners of cookers, &c. The arrangement is clear from the following drawings reproduced: Fig. 1, a plan of a portion of a cooker hotplate, with burners under grill frets; fig. 2, a section with burners revolved; and fig. 3, a perspective view of the main feature in the invention.

Fig. 1.

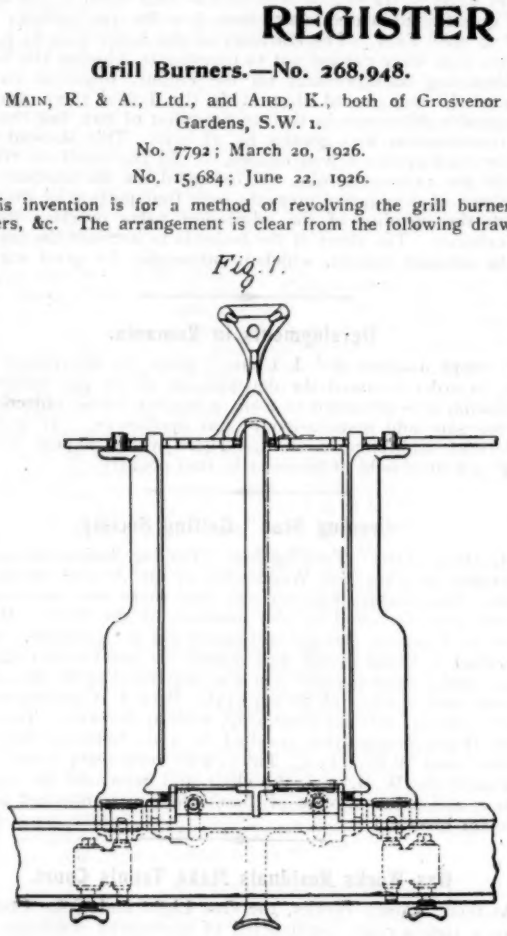
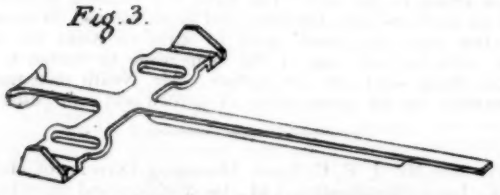


Fig. 2

Fig. 3.



Grill Burners.—R. & A. Main, Ltd.

The patentees claim:

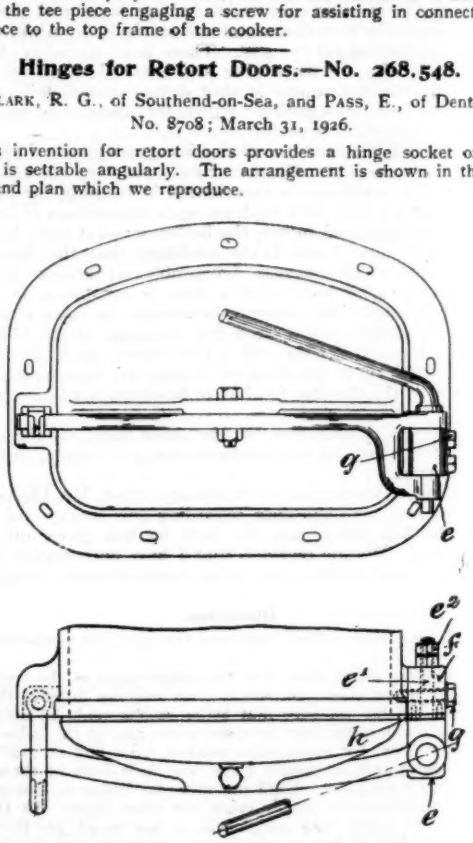
In gas cooking stoves, providing rotatable grill burners with a stub shaft in axial line with the gas inlet and with a projecting lug at each end—the burners being carried by the gas injectors and the frame or burners carrier—and a tee piece slidably connected to the top frame of the cooker; the arms of the tee piece being provided at the ends with walls having inclined and horizontal edges for operating the burners, parallel slots in the arms for connection of the tee piece to the top frame by screws, and a bar projecting from the tee piece and carried slidably by the frame or burners carrier or a slot in the leg of the tee piece engaging a screw for assisting in connecting the tee piece to the top frame of the cooker.

Hinges for Retort Doors.—No. 268,548.

Clark, R. G., of Southend-on-Sea, and Pass, E., of Denton.

No. 8708; March 31, 1926.

This invention for retort doors provides a hinge socket or block which is settable angularly. The arrangement is shown in the front view and plan which we reproduce.



Retort Door Hinges.—R. G. Clark and E. Pass.

The hinge socket or block *e* has a single rearwardly projecting shank e^1 formed with it, or applied thereto, and this shank is screw-threaded at its extremity. On the retort door frame is cast a block or pap *f* which is bored horizontally, but may be otherwise attached. On existing frames it may be welded on, or bolted on as by studs *g* as illustrated, it being the fixed part to which the hinge block *e* is to be fixed. This block *f* may on its front face have a countersunk recess either round, square, or otherwise in which is located a renewable serrated steel washer. In the drawing is shown a case-hardened

serrated washer h secured by grub screws. The shank e^1 of the hinge block e passes through the fixed bored block f, and lock nuts e^2 clamp the two elements together and so jamb the adjustable element against the fixed.

If a door falls, it is only necessary to slacken the lock nuts e^2 and to turn the movable element e angularly to restore the true disposition of the door, whereupon the lock nuts e^2 are screwed-up again. Thus, repeated adjustments can be made, and a door set up from time to time.

Distillation of Carbonaceous Substances. No. 268,080.

SUTCLIFFE, E. R., of Leigh.

No. 24,183; Sept. 28, 1925. No. 16,265; June 28, 1926.

This invention relates to the distillation of coal and other solid carbonaceous substances, more especially of the kind in which regenerators are used for heating the steam or the steam and gas—the vehicle by which heat is internally applied for carrying out the distillation.

According to the invention the gases and vapours, comprising the surplus steam used in the distillation, are brought into intimate contact with hot water or liquor, which is thereby heated to boiling-point, and steam is subsequently evaporated therefrom for transmission into the retort after being heated, for example in a regenerator.

The invention may advantageously be carried out under moderate temperature conditions—that is to say, the maximum temperature applied to the charge to be distilled is about 750° C.; the steam being pre-heated to a temperature correspondingly higher. It will, however, be understood that the maximum temperature should be under 1000° C., in order that the process shall result in the decomposition of methane, and that the water gas reaction may be minimized. Thus a relatively high yield of hydrogen results, with a correspondingly lower proportion of carbon monoxide.

If 100 lbs. of steam be admitted to the retort for every 100 lbs. of coal to be distilled, and if the water vapour and gases in the retort off-take be assumed to have a temperature of 300° to 350° Fahr., there is theoretically more than sufficient heat available to vaporize 100 lbs. of water at the same temperature. Thus, if the gas and vapour from the retort are sprayed with the water, for example, at 180° Fahr., the water used may be heated to 210° Fahr. Thus on the evaporation of a part of the water and consequent cooling of the remainder to about 190° Fahr., a substantial proportion, such as 50 lbs., of steam may be produced which may be compressed to the working pressure in the retort, and be passed through it after first being pre-heated.

The retort may be provided with two heaters or regenerators, which may be used alternately for suitable periods such as half-an-hour. They may be heated by the combustion therein of gas, and the steam produced in the manner before described may be projected therein with other gas or steam. Or instead, one heater or regenerator may be provided for each retort; the make of gas being discontinued in one retort during the heating period of its regenerator.

The gas and vapour from the retort may be sprayed with tar or other liquor before being sprayed by the heated water or liquor. Similarly, a part only of the gas and vapour from the retort may be used according to the invention, and means may be provided whereby one heat exchanger and evaporator may be used for two or more retorts.

We reproduce a diagrammatic view of the apparatus employed.

The patentee gives the following figures to demonstrate the utility of the invention and show the quantity of steam available per 100 lbs. of coal under the assumptions named. The following data are assumed:

Specific heat of gas and hydrocarbon vapours	0·3
Specific heat of water vapour at temperatures shown	0·5
Temp. of liquor after circulation	210° Fahr.
Temp. of liquor for circulation	188° Fahr.
Latent heat of water vapour at 212° Fahr.	970 B.Th.U.
Latent heat of water vapour leaving flash box at 183° Fahr.	988 B.Th.U.
Specific heat of water	1
Temp. of gases and vapours in retort	350° Fahr.
Temp. of gases and vapours leaving apparatus	185° Fahr.

The latent heat of the hydrocarbon vapours is not taken into account.

The conditions based on each 100 lbs. of coal under carbonization may be taken to be as follows:

Weight of gases and hydrocarbon vapours	40 lbs.
Condensable hydrocarbon vapour in apparatus	10 lbs.
Steam passed to retort per 100 lbs. of coal	180 lbs.
Steam recovered by apparatus	120 lbs.
Steam added as exhaust steam and for operating the ejectors	60 lbs.
The steam decomposed in the retort, say	5 lbs.
Steam and vapour condensed and passed from apparatus as surplus liquor	25 lbs.
Vapours contained in and mixed with gases leaving apparatus at X (in proportion at temperature named about 1 : 1)	30 lbs.

On the basis of these data the following figures show respectively the steam quantity and heat equations and the utilization of heat absorbed in the process.

Steam Quantity Equation.

ENTERING RETORT.		LEAVING APPARATUS.	
Exhaust steam and ejector steam	60 lbs.	Condensed to liquid	25 lbs.
Steam from steam recovery apparatus	120 lbs.	Contained in gases and vapour at X	30 lbs.
		Steam decomposed in retort and counted as gas	5 lbs.
		Recovered and returned to retort	120 lbs.
	180 lbs.		180 lbs.

Heat Equation.

QUANTITIES OF HEAT ABSORBED IN THE PROCESS.

From sensible heat of gases and hydrocarbon vapours entering at 350° and leaving at 185° Fahr.	= 40 × 0·3 (350 − 185) = 1980 B.Th.U.
From sensible heat of water vapour condensed in apparatus	= (180 − 5 − 30) 0·5 × (350 − 212 = 10,005 B.Th.U.
From sensible heat of water vapour entering at 350° and leaving apparatus at 185° Fahr.	= 30 × 0·5 × (350 − 185) = 2475 B.Th.U.
From latent heat of steam condensed by apparatus	= (180 − 5 − 30) × 970 = 140,650 B.Th.U.
Total	= 155,110 B.Th.U. absorbed.

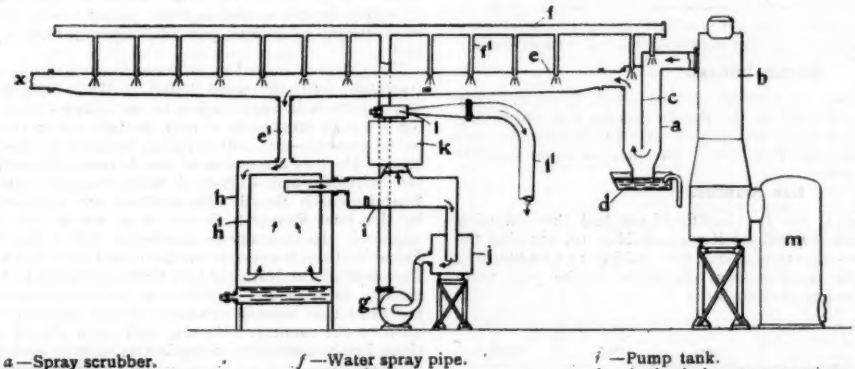
DISTRIBUTION OF HEAT ABSORBED IN THE PROCESS.

In 120 lbs. vapour exhausted from flash box and vaporized and passed to retort	= 120 × 988 = 118,560 B.Th.U.
Radiation losses	= 36,550 B.Th.U.
	= 155,110 B.Th.U.

For passing to the retort, the recovered vapour at 8 lbs. absolute requires heating to 213° Fahr. corresponding to an absolute pressure of 15 lbs. per sq. in.; and it is demonstrable that the energy in the 60 lbs. ejector steam and exhaust steam will effect the required duty. Thus, with ample margin for radiation losses the use of 60 lbs. of steam can induce a circulation effect equal to 180 lbs. of steam.

Means may be provided for the periodic admission of milk of lime into the tray tank, and at the lower end of the scrubber or heat exchanger and of the evaporator. Refuse tanks may be connected for the reception of the sludge and spent lime and liquor under the control of valves, and the sludge and spent lime and liquor may be periodically discharged from the refuse tanks through valves.

It will be understood, says the patentee, that gas and vapour ad-



a—Spray scrubber.
b—Retorts.
c—Partition.
d—Open tray tank.
e—Gas main.
f—Water spray pipe.
g—Pump.
h—Closed settling tank.
*h*¹—Inverted cylinder.
i—Evaporator or flash tank.
j—Pump tank.
k—Anti-priming steam receiver.
l—Ejector.
*l*¹—Pipe to regenerator.
m—Regenerator.

SUTCLIFFE'S COAL DISTILLATION PLANT.

mitted to the heat exchanger may be at a temperature of about 300° to 350° Fahr., and that as the water or liquor admitted at the top of the heat exchanger will have a temperature of about 200° Fahr., the water or liquor on leaving the heat exchanger and passing into the evaporator will have acquired a temperature of about 212° Fahr., and possibly higher, depending upon the pressure and other conditions under which the apparatus is operated. A certain part of the heated water or liquor will be evaporated in the evaporator, as the boiling-point will be reduced according to the vacuum used. The steam produced is then passed into the retort together with the other gases that may be used and with the steam that is projected into the retort for the purpose of circulation, while the water or liquor accumulating in the evaporator and which has fallen somewhat in temperature due to its partial evaporation is recirculated into the heat exchanger. In this way a considerable part of the heat of the gas and vapour from the retort off-take may be recovered and used for the generation of vapour for return into the retort.

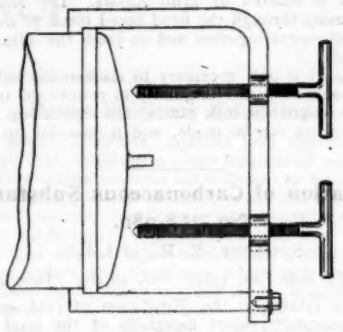
Clamping Gas Retort Doors.—No. 268,957.

Clark, R. G., of Southend-on-Sea, and Pass, E., of Denton.

No. 8707; March 31, 1926.

The patentees remark that, should anything happen to a retort door during distillation of the fuel charge, whereby the proper sealing of the mouth is affected, then it is a very difficult and somewhat dangerous matter to effect a temporary adjustment or repair to the fastening arrangements or otherwise. It also happens that from lack of attention the charge of gas may be burned, involving appreciable loss, for workers are not eager to attend to a defective door because no simple provision exists by which it can be held or satisfactorily clamped.

The invention concerns a simple device in the nature of a bent structure of roughly **U** shape and having bent-over extremities to the limbs whereby a structure capable of being pushed sideways into position in connection with a retort door is produced. In the straight



Temporary Clamp for Retort Doors.—R. G. Clark and E. Pass.

length are formed two bosses; and these are bored and threaded for the application of adjusting screws which have hand-wheels or lever arms for turning the screws.

We reproduce a side elevation of the appliance.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for May 11.]

Nos. 11,617—12,333.

Cooper, C.—"Drying gases." No. 11,691.
Davies, G.—"Gas lighter." No. 11,766.
Fry, A. E.—"Gas burners, &c." No. 11,824
Henshaw, D. M.—See Cooper, C. No. 11,691.
Holmes & Co., Ltd., W.C.—See Cooper, C. No. 11,691.
Jackson, L. Mellersh.—"Gas ranges." No. 12,225.
Martin, G.—"Gas economizer." No. 12,092.
Standard Gas Equipment Company,—See Jackson, L. Mellersh. No. 12,225.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

Progress of Bills.

Farnham Gas and Electricity and Reading Gas Bills: Returned from the Commons, with the amendments agreed to.

Leeds Corporation and West Bromwich Corporation Bills: Read a second time, and committed.

Scarborough Gas Company (Consolidation) Bill: The opposition to the Bill having been withdrawn, the Orders previously made were discharged, and the Bill committed.

Stoke-on-Trent Corporation (Gas) Bill: Reported, with amendments.

HOUSE OF COMMONS

Progress of Bills.

Farnham Gas and Electricity and Reading Gas Bills: Lords amendments considered, and agreed to.

South Staffordshire Mond Gas Bill: Further Standing Orders complied with; to be read a second time.

Commercial Gas and Manchester Corporation Bills: As amended, considered; to be read the third time.

Oil from Coal.

Replying, on May 5, to a question by Mr. Thurtle, the Duchess of Atholl said there were several processes of extracting oil from coal. Tar was obtained commercially in gas-works, &c., in Germany, as in this country. Low-temperature carbonization processes had long been employed for the extraction of oil from brown coals in Germany. It was understood that oil was now being produced on a commercial scale in Germany by the hydrogenation of brown coal.

Bergin Process.

Answering Colonel Day, on Tuesday of last week, Lord E. Percy said that the experimental work on the Bergin process was proceeding satisfactorily. It was too early yet to give any detailed results, and it must be some considerable time before the process could possibly come into commercial use.

Gas Mantles.

In reply to Mr. Hurd, Sir P. Cunliffe-Lister had the following statement circulated with the Official Report on May 10, showing the imports, exports, and re-exports of goods now subject to safeguarding duties, together with the revenue from the duties in the year 1926. The figures in regard to gas mantles are:

—	1924.	1925.	1926.
	£	£	£
Total imports	160,596	225,461	64,455
Re-exports	1,156	890	1,151
British exports	48,508	39,100	34,743
Customs revenue	..	..	12,000

COAL AND SCIENTIFIC RESEARCH.

Gas Light and Coke Company to make Technical and Commercial Investigation into Low-Temperature Carbonization.

In the House of Commons on Wednesday of last week Mr. William Adamson moved—

> That, in the opinion of this House, the scientific treatment of coal should be a normal function of the mining industry, which should apply and develop the proved commercial methods of treating raw coal as a means of increasing the national wealth, improving the prospects of the industry itself, and providing employment for the large number of miners wholly or partly unemployed, and every encouragement should be given by the State to scientific research into the treatment of coal. Further, this House declares that the co-ordination of coal production and coal treatment and the application of the results of publicly-aided research can only be fully secured by the unification of the coal industry under public ownership.

In the course of a long speech, Mr. Adamson referred to the fact that our coal was potentially a greater source of wealth than it had ever been in the course of our industrial history, if proper steps were taken to utilize it to its full value. He urged its distillation in order to provide oil, dyes, fertilizers, electric current, pulverized fuel, and smokeless fuel for both industrial and domestic purposes. He pointed out that annually we spent no less than £45,000,000 on oil for transport and industrial purposes, which figure would steadily grow year by year. He believed that in our coal we have a source of supply for oil second to none in the world, which would give, on an average, 20 gallons per ton, together with 14 cwt. of smokeless fuel.

Mr. Clayton moved as an amendment to leave out the whole of the resolution from the word "coal." While largely in agreement with Mr. Adamson in encouraging to the fullest extent the investigation of the scientific treatment of coal, he believed in the method adopted up to the present—viz., collaboration between the State and private enterprise. He was a member of the Advisory Council of the Department for Scientific and Industrial Research, and also a member of the Fuel Research Board. He outlined the work which has been done by the Fuel Research Board, with which our readers are well acquainted. Incidentally he mentioned that a short time ago Sir David Milne-Watson (Governor of the Gas Light and Coke Company, and President of the National Gas Council) was asked to make an investigation, through his experts, of the low-temperature carbonization processes that were in existence in this country. He sent his experts all over the country. He also sent them abroad wherever there were these low-temperature carbonization plants; and he was asked to see whether there was any process his Company could take up as a commercial proposition with or without Government assistance. After full investigation, he decided that the most suitable plant for adoption by the Gas Light and Coke Company to work in conjunction with the ordinary gas process was the plant designed by the members of the Fuel Research Board staff. This showed that the Fuel Re-

search Board staff were deserving of great praise for the work they had done. The Company said, while they thought this was the best process, they did not consider they were justified, as a Company, in bearing the entire cost of the long experiment on the process. He pointed out that with the best of these low-temperature processes there was a yield of only something between 15 and 20 gallons of oil per ton of coal—probably nearer 15 gallons. He also referred to the Bergius hydrogenization of coal. An option on a considerable amount of the interest in the British rights of the Bergius process had now been acquired by Imperial Chemical Industries. While the Bergius process had really only been developed up to a large experimental scale, a modification of it had been worked out by the German chemical group known as the Interessen Gemeinschaft, and they had at work now a full large-scale plant. The output of this plant was in the neighbourhood of 100,000 tons per annum of coal oil.

Considerable discussion followed, in the course of which the DUCHESS OF ATHOLL stated that the Government had asked Sir David Milne-Watson whether he was prepared to consider all existing low-temperature processes in detail and would advise the Government—

(*a*) Whether in his opinion any of these processes had reached such a point of development that it was worth while for his Company to continue the experimental development on a large scale;
(*b*) If so, whether he considered the selected process or processes sufficiently promising to justify his Company in taking the entire risk of this development;
(*c*) If not, whether he would submit a scheme after discussion whereby the Government would be asked to bear a part of the risk involved.

The result was as already stated—that Sir David Milne-Watson considered the process at the Fuel Research Station was the most promising development in conjunction with a gas-works. He further considered that no process was so far proved as to justify his Company in taking the whole risk of the development. He was, however, so far impressed with the desirability of co-operation with the Government in putting the matter to a practical test, as to offer a site for a 100 tons a day plant, and to undertake to erect the plant and run it as continuously as is reasonably practicable for a period of three years, provided that the Government would pay the original cost of providing and erecting the new plant necessary on the selected site, which had already many of the requisite conveniences. It was already arranged that a subsidiary Company should be formed, the capital of which had been guaranteed under the Trade Facilities Act. The Gas Company would act as managers for the Fuel Production Company, Ltd. At the end of 1930 the Gas Company have an option of purchasing the plant; or if they do not wish to do this, they will clear the site and dispose of the plant, &c., on behalf of the Fuel Company. All details are now being worked out; and it is hoped that the plant will be at work next winter. Steps have been taken to safeguard the public interest in any patents that may be taken out as the result of working the plant; and full details of the plant and results obtained will be published and at the disposal of any company desirous of working the process. The Gas Light and Coke Company are in effect carrying out the work for the benefit of the whole industry. This should provide definite information as to the commercial possibilities of the process.

The question was then put with the words proposed to be left out standing part of the question. The House divided; the result being that there were 123 in favour and 251 against. The main question was again proposed; but it being after 11 o'clock the debate stood adjourned.

LEGAL INTELLIGENCE.

AN ANTHRACENE CONTRACT.

In the King's Bench Division of the High Court of Justice, on May 13, Mr. Justice MACKINNON heard an action by the British Alizarine Company, Ltd., of Manchester, against Messrs. Major & Co., Ltd., of Norfolk Street, Strand, W.C., which concerned a contract for the supply of anthracene.

It was explained by Mr. MILLER, K.C., for the plaintiffs, who, he said, manufactured synthetic dyes, &c., that the defendants were tar distillers; and the dispute arose out of a contract, signed in 1919, for the sale by the defendants to plaintiffs of 500 tons of anthracene, to be delivered in a crude state. The point in the case was whether the contract was for anthracene manufactured only by the defendants. The plaintiffs claimed a declaration that the defendants could not deliver any but the anthracene manufactured by themselves.

It was stated that the anthracene delivered was all British made; but Mr. J. L. Major, Chairman and Managing-Director of defendant firm, denied that the contract was that the goods delivered should be manufactured only by his firm.

His LORDSHIP said he was of opinion that the contract did not bind the defendants to use their own manufacturing process to produce the anthracene supplied to the plaintiffs. Defendants could deliver any crude anthracene that complied with the terms of the contract; so that the plaintiffs could not claim the relief they asked. Defendants would have judgment, with costs.

CHALK FUEL, POWER-GAS, AND BYE-PRODUCTS COMPANY, LTD.

Summons Against Promoters Adjourned.

The hearing of a summons against those concerned with the operations of the Chalk Fuel, Power-Gas, and Bye-Products Company, Ltd., to which operations references have been made in the "JOURNAL" from time to time, should have taken place at the Mansion House Police Court, E.C., before Alderman Sir George Truscott, on Tuesday, May 10, but, owing to the illness of two of the defendants, the proceedings were postponed until Tuesday, June 21, at 11 a.m.

The defendants were Sir Charles B. Herne-Soame, Bart., Edward Warden, Robert George Harley, and Edmund Octavius Eaton. The charge was one of alleged conspiracy between Jan. 1, 1914, and April 12, 1927, to defraud persons who might receive prospectuses and pamphlets issued by the Chalk Fuel, Power-Gas, and Bye-Products Company, Ltd.; to obtain money from them by falsely pretending that certain reports appearing in the prospectuses and pamphlets were true and genuine reports on the facts therein referred to, and made by those by whom they purported to be made; and to commit offences against Section 84 of the Larceny Act.

Medical certificates as to the condition of two of the defendants were produced. Sir Charles Herne-Soame was stated to be crippled as the result of an accident which occurred in 1924, and unable to stand the long journey to London from his home in Shropshire. A certificate relating to Colonel Eaton was to the effect that he had recently had an operation, and that it would be dangerous for him to undergo the fatigue entailed by attendance at Court at such an early date.

An adjournment of six weeks was suggested by Mr. Elwell (for the defendants), who said that Colonel Eaton's life was really in danger, and it was improbable that he would be able to attend earlier. Whatever Sir Charles Herne-Soame was suffering from at present, however, he would probably be suffering from in six weeks' time.

Mr. W. N. Earle (for the prosecution) said he felt that he must accept the medical certificates produced. He asked for an adjournment to a definite date, and said that if a further adjournment were asked for then, it should be supported by medical evidence and not merely medical certificates.

It was suggested by Sir George Truscott that inquiries be made by the Police during the adjournment as to the *bona fides* of the certificates. It was stated also, on behalf of the defendants concerned, that they would be prepared to submit to examination by doctors nominated by the Police.

The proceedings were, therefore, adjourned as stated.

SOUTHERN COUNTIES ELECTRIC LIGHT AND POWER SUPPLY.

Compulsory Winding Up.

The statutory first meetings of creditors and shareholders under a compulsory winding-up order against the Southern Counties Electric Light and Power Company, of 121, Cheapside, E.C., were held at the Board of Trade offices last week, before Mr. H. E. Burgess (Senior Official Receiver), in whose hands the liquidation was left.

It was stated, according to the "Financial Times," that the Company was formed in November, 1924, with a nominal capital of £11,000, subsequently increased to £21,000, and was promoted by Edmund Octavius Eaton for the purpose of acquiring electric light and power undertakings in the Southern and Western Counties of Great Britain and elsewhere. Its immediate object, however, was to take over the benefit of certain contracts entered into by the Electricity Finance and Distribution Corporation—another of Mr. Eaton's companies—for the supply of electric power in certain areas. The issued capital was £18,247, and debentures were created; the total amount subscribed by the public being £32,326. Agreements were entered into in 1923-24 and 1925 for the establishment of an electrical generating station and laying of mains for supplying electricity in the district of Sturminster Newton, Dorset; for the acquisition of an electric light undertaking at Battle, Sussex; and for the extension of mains between Chagford and Moretonhampstead, Devon. In order to obtain the finance necessary to carry out the company's schemes, the Directors on Dec. 12, 1924, resolved to create first mortgage 7 p.ct. debentures of £25,000; and in the following March a prospectus was issued offering for subscription 20,000 £1 8¼ p.ct. participating preference shares at par and £15,000 first mortgage 7 p.ct. debentures of £10 at £9 16s.

The issue of the prospectus was carried out by the Electricity Finance and Distribution Corporation, and was supervised by Mr. Eaton at a fee of £100, *plus* travelling expenses. Owing to the poor response to the first issue, the prospectus was reprinted and further issues made in May, 1925. A new prospectus was issued in October, 1925, and further prospectuses were issued in February and June, 1926. Statements contained in the various prospectuses as to the position of the Company and its undertakings will be the subject of further investigation. In September, 1925, some of the debenture and share holders launched actions against the Company and its Directors for the return of moneys subscribed, on the grounds of fraudulent misrepresentations contained in the prospectus.

The failure of the Company is attributed by the Directors to insufficient capital at any one time to carry out its undertakings, the failure to obtain special Orders for the supply of electricity in the areas, and excessive cost of obtaining capital. The assets at the date of the winding-up order were estimated to be worth £7421, while the liabilities are stated to amount to £19,142, including a debenture debt of £16,700. There is no possibility of any surplus becoming available for the unsecured creditors.

MISCELLANEOUS NEWS.

IMPERIAL CONTINENTAL GAS ASSOCIATION.

ANNUAL ORDINARY GENERAL MEETING.

The Ordinary General Meeting of the Association was held on Wednesday, May 11, at the Cannon Street Hotel, E.C.—Sir Charles J. Jessel, Bart., in the chair.

The Secretary (Mr. F. H. James) read the notice convening the meeting; and thereafter the Common Seal was affixed to the Register of Proprietors.

The Chairman: I now beg to move:

That the interim dividend at the rate of 5 p.ct., less tax, paid in respect of the year ended Dec. 31, 1926, be hereby confirmed.

This was agreed to.

The Chairman then called upon the Secretary to read the Auditors' certificate on the accounts submitted; and this was done.

The Late Mr. R. W. Wilson.

The Chairman: Ladies and Gentlemen,—I shall presently move a resolution, to put myself in order. For a few moments, however, I will address to you some remarks upon the balance-sheet. I must, however, begin by apologising for the absence to-day of our colleague Sir Henry Birchenough, who, as I daresay many of you are aware, is the Chairman of the Chartered Company of British South Africa; and he is now on his way to that distant land. But I think that the face which will be most missed from this side of the table will be that of Robert William Wilson ["Hear, hear"], who during the whole of the time that I have also sat on this side of the table—and that is for over thirty years—was either Secretary or a Director of this Association. Wilson was a man of very extraordinary gifts. He had brains; he had tact; he had great powers of organization; and he had no mean mechanical skill and knowledge. He possessed, in fact, valuable characteristics. All these gifts compelled our admiration, and, I think I may say on behalf of my colleagues, evoked our affection. We shall hold him long in loving remembrance. God rest his soul in peace.

Profit from Stations.

I shall now proceed to take you through the accounts, and will ask you first of all to kindly turn to the right-hand side of the profit and loss account. The first item, "By net profit from stations," shows a decrease of £23,949. The Association's principal directly-controlled stations are situated in Belgium; and the serious break in the Belgian exchange during 1926 chiefly accounts for this decrease. In fact, it is a cause for congratulation that the decrease in profit was not larger. The following mean rates, extracted from "The Times" daily quotations, give some idea of the fluctuation in the rate of exchange on Brussels:

On Dec. 31st, 1925	Fcs. 107	to the pound
,, ,, 1920	Fcs. 174·45	,, ,,
Average rates of the year 1925 . . .	Fcs. 101·78	,, ,,
,, ,, ,, ,, 1920 . . .	Fcs. 155·08	,, ,,
The highest mean rate of the year 1920 was that of July 12	Fcs. 223·37½	,, ,,

In view of the stabilization of the Belgian exchange in October last at Fcs.175 to the pound, it is to be hoped that most of our exchange troubles are now over.

Relation of Gas Prices to Increased Costs.

Whereas stabilization of an exchange is a matter of political policy, and, other conditions being favourable, can be settled by a Cabinet decision, the adjustment of internal prices to the gold level is the outcome of a process which is slow, if automatic, in operation. This process, consisting of the interplay of wages and prices, is still going on in Belgium, so that we have not yet arrived at normal trading conditions. Our charges are increasing, and so are our prices; but a good deal depends upon the extent to which the prices which we are allowed to charge for gas and electricity keep pace with the increase in wages, &c. Our prices are revised quarterly on a basis which takes into consideration either one or both of the factors, price of coal, and rate of wages. Some weeks elapse before wages respond to the increase in the cost of living, and some months elapse before we get in gas prices corresponding to the increased wages which we are paying. Antwerp offers an instance of the way in which the Association is affected. The present gas price shows an increase of just under six-and-a-half times as compared with pre-war; while coal prices show an increase of eight times and stokers' wages of eleven times. The index figure of the cost of living for Antwerp shows an increase of just over eight times. Electricity prices are an even worse laggard than gas prices, and show an increase on pre-war of only four-and-a-half times. In fact, through circumstances which are not within our control, we were supplying current for lighting purposes during 1926 at an average price of 1·8d. per unit, and high-tension current at 0·6d. per unit. Electricity is about the cheapest thing in Belgium. For these low sterling prices we must partly blame the difference between the internal purchasing power of the franc and its exchange value. These low gas and electricity prices, although they do not strike the Belgian consumer as being so very low, have one good effect in that, while reducing our sterling profits, they tend to increase the amount of our output and the number of our consumers.

Effect of Franc Depreciation on Instalment Payments.

A further instance of the way in which we were hit by the depreciation of the exchange occurs in the sale of apparatus on the deferred purchase system. A gas cooker, for example, was perhaps bought by us in England at a sterling price, and was sold to a Belgian consumer at a price converted at the franc equivalent of its sterling cost to us on the day on which he effected the purchase. Owing to the subsequent depreciation of the franc, the total instalment payments received from the consumer, converted at the rate of exchange on the various dates of collection, left us with a sterling loss on the sale of that piece of apparatus, although there was a franc profit. Many consumers cannot afford to pay outright for a piece of apparatus; and as our primary object is to sell gas, we have to give all reasonable facilities to the consumer to acquire apparatus which will assist the sale of gas. In fact, ladies and gentlemen, 1926 has been a most anxious and difficult year; and but for the whole-hearted co-operation of our staff abroad in our endeavours to keep down costs and expand the business, the sterling profits, which were converted at the average rate of Fcs.155·08 per pound, would have compared very unfavourably with those of 1925, which were converted at Fcs. 101·78. Another factor tending to make the 1926 results compare still more unfavourably was that the closing rate at which the floating assets were converted was Fcs.174·45, as compared with Fcs.107 in 1925.

Coal Prices and Coke Stocks.

To add to our anxieties, there were the effects of the English coal strike. Although at the commencement of the English miners' strike on the 1st of May last year the Association's stocks of coal ranged from nine-and-a-half weeks to fifteen weeks, the largely increased demand for Continental coals of all descriptions, resulting from the strike, gradually told on deliveries; and by the end of December our stocks had fallen in the case of one station to only enough for five days' workings—a figure which is, I think, unprecedented in the history of the Association at that station, at any rate in peace time, the normal stock being six weeks. In fact the Belgian Authorities were about to issue an order restricting the use of gas; but fortunately the end of the strike intervened, and relieved the situation. As regards price, the stoppage of English supplies led, as was to be expected, to a steady rise in the cost of all Continental coals; and this was accentuated by the depreciation of the franc. At the same time, the strike had its compensations for us. At Antwerp there were relatively large stocks of coke in hand in the earlier part of 1926; and the demand for fuel towards the end of the year enabled us to dispose of our stock of this residual to advantage. This factor contributed somewhat towards off-setting the ill-effects of the depreciated franc. Our other stations in Holland and Czecho-Slovakia, which were not affected by currency instability, have continued to show satisfactory vitality.

Prolongations of contracts and new contracts have been effected with communes representing in the aggregate a population of 32,000. Most of the contracts in question now run until 1960.

Further Profit and Loss Account Figures.

The second item in the profit and loss account, "Dividends on investments, interest, discounts, &c.," shows a reduction of £10,546 on the figure of 1925. The two principal items which account for this are the dividend received from the Cie. Continentale du Gaz and interest on loans. The latter item is naturally less owing to the smaller amount out on loan in London during the year; while the decrease in the amount received from the Cie. Continentale is due to the depreciation in the value of French currency at the time the dividend was received. The interim and final dividends of the Cie. Continentale were remitted at the following average rates: 1925, Fcs.101·31 to the pound; and 1926, Fcs.152·54 to the pound. I should like to say that this decrease in the amount received took place in spite of the Cie. Continentale du Gaz having raised their dividend from 12 to 14 p.ct. per annum. This year we received our interim dividend during April at the same rate as last year—that is, 6 p.ct. per annum—and we have already benefited to the extent of £3000 in comparison with last year. I need not trouble you about the "Revenue proportion of German compromise," or the "Rent of sub-basement, 6, London Wall." We can therefore go now to the other side of the account. I might perhaps say a word with respect to "Expenses in London," &c., having gone up £463. We have made several economies; but the Directors have taken advantage of the amount that was voted to them nearly twenty years ago—£6000 per annum, free of tax—and have drawn this, instead of the lesser sum that they received during the war. I would say, in regard to this, that in my own individual case I am no better off, so far as receipts in sterling are concerned, than I was before the war; while at the same time the pound does not buy as much as it did then. Therefore I may consider myself as being worse off even now than I was before the war. Then comes the item of "Income-tax and corporation profits tax." There is no corporation profits tax now; while as to income-tax, there is on this occasion no abnormal revenue, and therefore the income-tax is less. "Interest on debenture stock" is less also, because we have bought and cancelled £3040 of stock. "General amortization account" is slightly down. When we were richer, we made many large allocations, and so require smaller sums to-day. Next, "Depreciation of sundry assets, written-off," is less, because we need less to write-down foreign securities; and "Legal charges," &c., are down, because last year there were expenses in connection with the purchase of 2, Devonshire Square.

As you will see, the balance is less by £30,000; and we should be short by £8867, if we had to pay the dividend entirely out of profits.

CAPITAL EXPENDITURE.

Now, if you will look at the right-hand side of the balance-sheet, you will notice that we have incurred capital expenditure to the extent of £149,745. More than half of this has had to be spent on the Brussels electric station. In fact, we spent no less than £43,000 on cables alone. Of the 1540 miles of gas mains which the Association possess, 46 miles were laid in 1926; and of the 600 miles of electric cables, we laid 37 miles in 1926. Then we have spent money on waste-heat boilers, coal handling plant, and automatic stokers—all for purposes of more economical working. We have, though it does not appear in these accounts, ordered a 12,500 KW. turbo-alternator; and there is much further outlay to be incurred. There is a note on the other side of the balance-sheet to the effect that there are contingent liabilities in respect of plant and stores ordered for stations, &c., £182,445.

OTHER BALANCE-SHEET ITEMS.

"Stocks at stations" are much less. As I have already explained, we got rid of our coke; and you cannot "have your cake and eat it too." Therefore if it is not in coke it has been in money; but the money was in depreciated francs, and so there is not much in it. Of coal in stock, too, we had in 1925, at Antwerp, for instance, 34,558 tons, and in 1926 7737 tons—very much less. "Cash at bankers' in London and at London office" is up considerably. Naturally every franc we could get during the critical period from March to October, 1926, was remitted. The next item, "Sundry debtors," is down £52,730, because certain debts at Brussels and Prague were repaid. "Loans in London" were down very largely, because we had to pay to the shareholders last May £246,385, and then there was the interim dividend amounting to £79,039 in November; so that we disbursed to our shareholders last year £325,424. "Freehold property in London and abroad" accounts for an increase of £14,665. We have, for the purpose of decentralization in our Belgian stations, been buying sites, in order to work our out-door services to better advantage. There is nothing else here to which to call attention, except "English, Colonial, and Indian securities," which item is down about £42,000; the reason for this, of course, being that certain temporary investments had to be disposed of, such as Treasury bills and bonds, in order to make the payments to our shareholders and for capital purposes.

"HIDDEN RESERVES."

On the other side of the balance-sheet, I have already explained to to you about the debenture stock. There are still a few people who prefer their money to remain with us, instead of taking it. I have also referred to the amortization account. Then I should like to explain the next item—"Sundry creditors." A gentleman wrote to me some time ago making an elaborate analysis of our balance-sheet; and he spoke a great deal about our "hidden reserves." I should like to say at once that I am not aware of any hidden reserves. We are governed by our Act of Parliament; and until a very short time ago it was our usual course, when we were in the enjoyment of "prosperous obscurity," to submit to our shareholders at the general meeting a scheme prepared in accordance with the Companies' Clauses Consolidation Act, 1845, showing the profit available for the purposes of dividend. That is all we used in those days to give our shareholders; but when we emerged from this obscurity, which I have mentioned, and became the plaything of the Stock Exchange and the speculator, the Board thought it would be very much better to unfold the whole tale, and show a really honest balance-sheet. A well-known member of the Stock Exchange once spoke to me in the street, and congratulated me on our balance-sheet. He said he knew of no other company that gave such full details as we did as to our position. There was, however, I found, one item that covered a certain amount of what one might call hidden profit, and that was "Sundry creditors," because that included credit balances. That is to say, we have had profits, for instance, from the sale of securities, and we have had book profits from our purchases of debenture stock. These two items together amount to over £100,000; and they are profits which we have no intention, unless driven to it, of dividing among our shareholders. But still they are profits; and in that way it might be said, when they were included in "Sundry creditors," that they were hidden. They are, however, no longer so, as they appear as "Credit balances." Then, again, we have always pursued the very useful course of making a reserve for income-tax purposes. We used to be assessed, and shall be up to this year, on our three years' average receipts; and it was convenient to have a certain amount of reserve in "Credit balances." Then, again, we are engaged, as you know, in getting into new premises; and one can never tell exactly what new premises will cost. Therefore we have made ample reserves, in case of the cost being more than we originally thought it would be. This also appears in the "Credit balances." The "Sundry creditors," naturally enough, are real debts. The creditors at the stations are less, of course, consequent upon the depreciation of the franc; and we owe more money in sterling pounds to contractors. Then the "Renewals fund" is up. We did not make any special allocation this year like last year, when we had a large sum of money to spare. The Board write off certain things which they regard as of short life; and then they debit that account with articles like lanterns, &c., which have to be scrapped. This year, for instance, we wrote off about £19,000, and then had to take away some £14,000 for items that had been meanwhile scrapped. The difference between these two figures is £5000; and that is why the renewals fund is that amount up. The Proposed Profit and Loss Appropriation Account speaks for itself, and so far as the balance-sheet is concerned, I have done with it for the moment; but I shall be very pleased to answer any questions that may be put to me after I have moved the following resolution:

That the accounts for the year 1926 and the scheme prepared in accordance with the Companies' Clauses Consolidation Act, 1845, showing the profit available for the purposes of dividend, which the proprietors have before them in the form of the profit and loss appropriation account, be taken as read.

This was agreed to.

THE DIVIDEND.

The CHAIRMAN: I now beg to move:

That upon the holdings of capital stock as registered in the books of the Association on the 20th of April, 1927, there be paid on the 16th of May, 1927, less income-tax at 4s. in the pound, a final ordinary dividend for the year ended Dec. 31, 1926, at the rate of 5 p.ct. (actual), making with the interim dividend of 5 p.ct. (actual) paid in November, 1926, a dividend of 10 p.ct. for the year, leaving £61,159 9s. to be carried forward to the next account.

The DEPUTY-CHAIRMAN (Col. H. LeRoy-Lewis, C.B., C.M.G., D.S.O.): I have pleasure in seconding that.

The resolution was carried.

The CHAIRMAN: I have next to move:

That the accounts, together with the scheme for the appropriation of the profits, which have been submitted, be received, adopted, and entered upon the minutes.

The DEPUTY-CHAIRMAN seconded this, and it was unanimously agreed to, without discussion.

RE-ELECTIONS.

The CHAIRMAN: We now come to the re-election of three Directors. I will not say anything about the first of these gentlemen—Col. LeRoy-Lewis—because there is a sort of convention among the members of this Board that we should not "butter-up" one another on these occasions. The other two gentlemen, however—Mr. George Jessel and Mr. Michael H. Tetley—both come up for re-election for the first time. Mr. Jessel has been with us nearly three years, because he succeeded a gentleman who had been re-elected to the Board just before he died. I do not like, on account of the position I am in with respect to Mr. Jessel, to say too much about him; but he had claims upon us as the son of the Chairman, the grandson of a Chairman, and the great-great-grandson of a gentleman who was one of the founders of this Association. I will only say this—that when his election to the Board was moved, the Deputy-Chairman (Col. LeRoy-Lewis), who had known him in his very young days, said: "Even if he were not the son of the Chairman, I think he would be the most suitable man to be elected a Director." I hope that my colleagues are as well satisfied as I am with the result. The next person whose election I have to move is Mr. Michael H. Tetley. He has only been with us a few months; but we feel already that we have made an excellent choice. It was a choice that was particularly good, because, with his mechanical tastes and knowledge, he very well filled the gap in our ranks which was caused by the lamented death of Mr. Robert Wilson. I beg to move the re-election as Directors of the Association of Col. H. LeRoy-Lewis, C.B., C.M.G., D.S.O., Mr. George Jessel, M.C., and Mr. Michael Hubert Tetley, M.Inst.Mech.E.

This was seconded by the Right Hon. Sir GUY D. A. FLEETWOOD WILSON, G.C.I.E., K.C.B., K.C.M.G., and unanimously passed.

On the proposition of Mr. PERCY DE WORMS, seconded by Mr. G. E. BEDDINGTON, the retiring Auditor (Mr. C. F. Dendy Marshall, M.A.) was re-appointed.

VOTES OF THANKS.

The CHAIRMAN: Before we separate, I should like to say once again how thankful we all are to our staff, both at home and abroad, for the excellent work they have done during a year of great difficulty. They have all done splendidly, particularly the Managers. Curiously enough, the "nepotic tendency" to which I have referred in connection with the Board of the Association reveals itself also among its officials; but it has always resulted successfully, for we do not appoint people simply because they are sons or nephews of old servants, but because we think they ought to be so appointed. At three of the four gas-works we have in Belgium, the Engineers are related to former servants of the Association. We have at Forest Mr. de Vigne, son of the former Manager at Lille; at Hoboken Mr. Wilson, son of the late Secretary; and at Berchem Mr. Popelier, nephew of our late Engineer at the Dam Works.

All these three men, as well as the fourth, who is not related to any former servant, have, as I have already said, done excellent work; and so have our Engineers at the Electricity works and the staffs at the various stations. At home we have nothing but praise for our admirable staff. In Mr. James we have a first-rate servant, whose loyalty and hard work on behalf of the Association have been unparalleled during the past year. I propose a hearty vote of thanks to them all.

Mr. VERE H. SMITH: It will not be inappropriate if my fellow shareholders will allow me to second your vote of thanks to the officials and staffs. I think we all fully understand the good work they have done during a difficult year; and I know, from my experience as a Director, that staffs do appreciate an acknowledgment of their services at meetings of shareholders. I have no doubt you will take steps to convey these thanks to the right quarters. Now, I should like to propose a vote of thanks to you for your conduct in the chair, and to the Board generally for their work during the past year.

Mr. C. HOLMES HUNT seconded this.

The votes of thanks were cordially passed by the proprietors.

The CHAIRMAN: I beg to thank you very much. Not only do our staff value these marks of appreciation, but my colleagues and I also are very grateful to be remembered on these occasions.

GAS EXHIBITION AT BUXTON.

On Monday, May 9, the Mayoress of Buxton (Mrs. Goodwin), accompanied by the Mayor (Councillor W. Goodwin), opened a gas exhibition organized by the Gas Department of the Corporation, at the Gas Service Building.

Mr. F. G. Shaw, the Gas Engineer, spoke of the success that had attended former gas exhibitions and cookery demonstrations in Buxton. He mentioned that in the last two years they had sold for cash and on hire-purchase 320 high-grade cookers and 500 gas fires.

"These are remarkable figures when you take into consideration the comparatively small number of consumers in Buxton," said Mr. Shaw. "Unfortunately last year during the time of the lectures we had the industrial trouble brewing, and then there was the coal dispute. Notwithstanding all these difficulties, we managed to maintain the gas supplies, with an increase in the price of only 6d. per 1000 c.ft. for 4½ months. It must be pleasing to the consumers to find that so soon after the settlement of the coal dispute we have been able to cancel the increase, and return to normal prices."

Mr. Shaw said that he wished to institute a general system of maintenance under which a skilled fitter would go round to all the houses, and examine the appliances, adjust them, and put them in first-class order, without any cost to the consumers.

The Mayoress, in declaring the exhibition open, complimented Mr. Shaw on his enterprise in organizing it. Cooking by gas, she continued, was a well-tried and economical method. The gas cooker was a labour and money saver, and its use helped to abate the smoke nuisance.

Following the opening ceremony, Miss H. H. Tuxford gave a lecture and a practical cookery demonstration. These lectures are being held daily at 3 p.m. and 7 p.m., until May 21.

DEVONPORT GAS-WORKS MANAGEMENT.

Tribute to Mr. Bradshaw.

When the minutes of the Gas Committee were introduced at the meeting of the Plymouth Town Council on Monday, May 9, reference was made to the regret felt at the resignation of Mr. J. R. Bradshaw (the Engineer of their Devonport Gas-Works), who, as already announced in the "Journal," has been appointed to succeed the late Mr. A. W. Branson as Engineer, Manager, and Secretary of the Hartlepool Gas and Water Company.

Mr. J. Clifford Tozer (the Chairman of the Committee) said the question would naturally be asked, Why was the Engineer leaving? He wished to say that in the main it was on account of treatment meted out to him by certain members of the Committee and certain members of the Council. For some reason or other, he continued, there were certain members of the Council who undoubtedly lacked the first essentials of being gentlemen, and who showed an absolute lack of respect to the chief official in the gas undertaking. What was the reason? He ventured to say it was because they found in Mr. Bradshaw a man who refused to be intimidated or domineered over by certain members of the Gas Committee. He congratulated Mr. Bradshaw on the stand which he had taken; and he could only say that it would be a very serious thing for the general administration of the borough if at any time the Labour party should be in power, and behave as they had done towards Mr. Bradshaw since he had been the Engineer and doing his best in the interests of the undertaking. He certainly hoped that when the new Engineer was appointed they would have greater harmony. While Mr. Bradshaw had been Engineer of their undertaking, he had undoubtedly shown himself to be an official of very considerable ability; and its position had greatly improved during the nine months he had exercised control. In the main, Mr. Bradshaw had been responsible for effecting many important economies in connection with the undertaking. During the past twelve months the gas output had increased by more than 37 million c.ft., and new schemes had been introduced by the Engineer which would mean the spending of something like £50,000 in improving the supply and maintaining the general efficiency of the works.

Mr. H. M. Medland, one of the Labour members, took exception to Mr. Tozer's remarks, and challenged anyone to say that the Labour members had ever departed from the proper bounds of conduct. He congratulated the Engineer on having obtained a better job; but he advised him to study psychology. A contented and happy band of workers would give 20 p.ct. increased production. The Labour members did not intend to allow the setting-up of a bureaucracy inside the Council, and would sift, every time, the advice given by any official.

Mr. J. Hellen asserted, as a member of the Committee, that the Engineer had been driven away; and he hoped he would meet with better friends at West Hartlepool.

Mr. F. J. Barrett said the Engineer told the Gas Committee that he was not leaving Plymouth because of any dispute with the members.

Mr. Tozer, in reply, declared that, if the business of the Committee had been carried on in a friendly manner, the Engineer would not have endeavoured to get an appointment elsewhere. He was prompted to do so because of the unpleasant happenings on the Committee.

The minute accepting the resignation of the Engineer, and resolving to issue advertisements at once for his successor, at a salary of £750, rising by £50 per annum to £850, was agreed to.

Reduced Charges at Stratford-on-Avon.—At the quarterly meeting of the Stratford-on-Avon Town Council, it was decided to reduce the price of gas by 1s. per 1000 c.ft. Alderman Ballance said they were anticipating an increased demand for gas.

LONDON COUNTY COUNCIL GAS TESTS.

The following are details of the tests of gas supplied to the Metropolis, which were carried out during the quarter ended March 31 by inspectors in the Public Control Department of the London County Council.

Gas Light and Coke Company.—The gas was tested on 990 occasions for calorific value (involving 1350 individual tests), and gave results varying between 523·9 and 486·0 B.Th.U., with an average of 501·8 B.Th.U. for the quarter; the standard declared by the Company being 500 B.Th.U. per c.ft. The pressure of the gas was tested on 1428 occasions, and was found on every occasion to exceed the statutory minimum of 2 in. of water pressure. 798 tests were made for sulphuretted hydrogen; there being no case of deficiency. 153 tests of sulphur in the gas were made; the results being: Maximum 34·8, minimum 10·6, and the average 25·8 grains per 100 c.ft. of gas.

Commercial Gas Company.—The gas was tested for calorific value on 270 occasions (involving 541 individual tests), and gave results varying between 521·4 and 459·3 B.Th.U., with an average of 482·8 B.Th.U. for the quarter; the standard declared by the Company being 475 B.Th.U. per c.ft. The pressure of the gas was tested on 540 occasions, and was found on every occasion to exceed the statutory minimum of 2 in. of water pressure. 270 tests were made for sulphuretted hydrogen; there being no case of deficiency. 153 tests for sulphur in the gas were made; the results being: Maximum 48·5, minimum 15·7, and the average 25·6 grains per 100 c.ft. of gas.

South Metropolitan Gas Company.—The gas was tested for calorific value on 540 occasions (involving 1080 individual tests), and gave results varying between 573·0 and 551·8 B.Th.U., with an average of 561·9 B.Th.U. for the quarter; the standard declared by the Company being 560 B.Th.U. per c.ft. The pressure of the gas was tested on 1080 occasions, and was found on every occasion to exceed the statutory minimum of 2 in. of water pressure. 540 tests were made for sulphuretted hydrogen; there being no case of deficiency. 459 tests for sulphur in the gas were made; the results being: Maximum 52·2, minimum 6·2, and the average 19·2 grains per 100 c.ft. of gas.

South Suburban Gas Company.—The gas was tested for calorific value on 90 occasions (involving 180 individual tests), and gave results varying between 519·2 and 485·3 B.Th.U., with an average of 502·0 B.Th.U. for the quarter; the standard declared by the Company being 500 B.Th.U. per c.ft. The pressure of the gas was tested on 180 occasions, and was found on every occasion to exceed the statutory minimum of 2 in. of water pressure. 90 tests were made for sulphuretted hydrogen; there being no case of deficiency.

Wandsworth, Wimbledon, and Epsom District Gas Company.—The gas was tested for calorific value on 76 occasions (involving 52 individual tests), and gave results varying between 484·3 and 460·4 B.Th.U., with an average of 473·5 B.Th.U. for the quarter; the standard declared by the Company being 470 B.Th.U. per c.ft. The pressure of the gas was tested on 152 occasions, and was found on every occasion to exceed the statutory minimum of 2 in. of water pressure. 76 tests were made for sulphuretted hydrogen, there being no case of deficiency.

TRADE NOTES.

A New Sugg Catalogue.

Messrs. William Sugg & Co., Ltd., of Westminster, have published a new public lighting catalogue. In this there is a useful table of comparative costs of gas and electricity; and several pages at the end of the publication are devoted to polar curves recording various candle-power tests and to a table of relative illumination figures of lamps at various distances and heights.

"Torbay" Paint.

The Torbay Paint Company, Ltd., of 26-28, Billiter Street, E.C. 3, have published an illustrated booklet in which they describe their manufactures. They make special paint for water gas plant, meter enamels, jet black for cookers, &c. One of the illustrations in the booklet is of the three-lift spiral-guided holder erected for the Great Western Railway Company by Messrs. C. & W. Walker, Ltd., and painted with "Torbay" paint.

"Dempster-Toogood" Verticals at Oldham.

The Oldham Corporation have recently placed the order for renewing half of the "Dempster-Toogood" installation of verticals at the Central Works. More than passing interest attaches to this information, because the Oldham installation was one of the pioneer plants in connection with the now universally-adopted method of steaming continuous vertical retorts. Moreover, built and set to work in 1914, this, the first large-scale installation on the "Dempster-Toogood" system (the first plant being, of course, at Hebden Bridge), is now having the retorts renewed in the lower portion for the first time—viz., after thirteen years' continuous working—a result with which everyone can feel fully satisfied.

Orders for Messrs. W. C. Holmes & Co., Ltd.

Messrs. W. C. Holmes & Co., Ltd., of Huddersfield, have recently secured repeat orders for their new patent brush rotary washers for ammonia from the Gas Light and Coke Company (Bromley Station), Sheffield, Meltham, Copenhagen, West's Gas Improvement Company, Ltd. (Johannesburg), and Vancouver; and for gas drying and naphthalene removal for Bournemouth, Bristol, Weston-super-Mare, and Long Eaton. Gas drying equipment is also being supplied to the Portsmouth and Tunbridge Wells Gas Companies. The firm have recently secured orders for "Wikner" patent tar dehydrating stills from the Glasgow Corporation Gas Department and the Consett Steel and Iron Company, for use in conjunction with existing "pot" stills.

REPORT OF THE LIVESEY PROFESSOR AT LEEDS.

Prof. John W. Cobb, C.B.E., B.Sc. (London and Leeds), F.I.C. (Livesey Professor at the University of Leeds), has submitted his report for the sessions 1924-25 and 1925-26 to the Chairman (Mr. C. F. Tetley, M.A., LL.D.) and members of the Livesey Advisory Committee on the work of the Department of Coal Gas and Fuel Industries (with Metallurgy).

The two years under review, 1924-26, have been marked by the entry of students who had already graduated at our own or other Universities (Cambridge and London), but who desired a post-graduate training in fuel. One of these was a woman student who took the Diploma in Gas Engineering in her first session, and followed that up by engaging on research work which led up to the B.Sc. degree with honours.

The number of entries of normal students for the three years' course remains about the same, which invites comment considering the prominence given to fuel science in the Press and elsewhere in recent years, and the fact that our graduates have never remained long unsought for. Moreover, when the scientific development of our coal resources, as recommended by the Royal Commission on the Coal Industry, and approved by the Government, comes to be made effective, there will be a great shortage of men of the required training and experience.

The considerable extension of equipment in the Mining Department, which shares the building occupied by the Fuel Department, has involved the vacation of space which the Mining Department had previously lent for our use. This has coincided with the return of the Gas Research Staff from Birmingham; and a considerable congestion in the Department has resulted, which will impede the satisfactory working of both teaching and research in the immediate future, though eventually the position should be eased by the erection of a new building for the Mining Department. This extension has been made possible by the generosity of the West Yorkshire Coal Owners' Association, who have promised £25,000 for the purpose. As the present building was erected in 1908 by funds provided from the same source, it is clear that the Department and the gas and fuel industries are greatly indebted to the Yorkshire colliery proprietors for their outlay of capital in the past and future. The housing of the Department will never be put upon a satisfactory basis until the whole of the present building is made available; and it is particularly desirable, at a time when the interest in fuel is so largely stimulated, that the work should not be hampered by inadequate accommodation. It is on these grounds that the University is so fully justified in seeking support for the Appeal Fund, a petition which has already found a generous response in many quarters, as indicated later in the report.

It is interesting to note the activity in this direction of the United States as recorded in the April number of the American Gas Association Monthly, where an account is given of the School of Gas Engineering established two years ago at Johns Hopkins University, Baltimore. American gas engineers hold that it has become necessary for a progressive industry to ensure as its recruits men of good education and technical training, and, as a step towards this end, they have established the school. A representative of those concerned visited Leeds before the new school was opened, to inspect the Department and its curriculum. It is encouraging to us to note that the curriculum at the Johns Hopkins University, both in form and content, bears a close resemblance to that at Leeds, which seems to show that our course meets with very practical approval from the American gas engineers dealing with the matter. Belief in the value of such a training is also indicated by the number of entrants to the course, and the fact that several important American gas companies have established scholarships for their employees.

Our entry of students for training in metallurgy has fallen away at present, doubtless owing to the stagnation in the metal and engineering trades, which are offering few openings for metallurgists. All engineering students, however, are attending a course on metallurgy arranged to meet their needs, dealing with the nature and properties of the metals and alloys used in engineering practice. Gas engineering students may, and often do, take this course, which will be supplemented by laboratory instruction as soon as accommodation permits; and a corresponding course has been arranged for all students of mining, including laboratory instruction. Metallurgical research is also in hand.

An analysis of the numbers of students of gas engineering and of fuel and metallurgy may be presented as follows:

—	1924-25.	1925-26.
Full-time students—		
1st year B.Sc. course	5	3
2nd " " "	4	4
3rd and 4th year B.Sc. course	2	3
Post-graduate degree students	2	5
Post-graduate diploma students	3	2
Diploma and non-degree students	1	3
Occasional	1	2
	18	22

The students may be classified thus:

—	1924-25.	1925-26.
Gas engineering	16	21
Fuel and metallurgy	2	1

Forty-eight students in 1924-25, and twenty-six in 1925-26, of engineering and mining, and advanced students of colour chemistry also attended lectures in fuel and metallurgy.

CORBET-WOODALL SCHOLARSHIP.—Mr. Grant gave up the Corbet-Woodall Scholarship in 1926. It has been awarded to Mr. C. B. Bolland, of Batley Grammar School.

CLASSES.—All the ordinary day classes have been held, and no change has been made in the curriculum.

The special evening lectures have again been given, as detailed below:

In 1925:

(1) FURNACES AND THE UTILIZATION OF FUEL (six lectures), by Prof. J. W. Cobb.

(2) PRINCIPLES OF GAS DISTRIBUTION (six lectures), by Mr. Stephen Lacey, B.Sc., Distribution Engineer, Gas Light and Coke Company.

(3) BYE-PRODUCT COKING PROCESSES (eight lectures), by Mr. C. P. Finn, B.Sc., F.I.C., Manvers Main Collieries Company, Ltd.

(4) WASTE-HEAT BOILERS (two lectures), by Dr. A. Parker, Research Chemist to the Joint Research Committee of the Institution of Gas Engineers and the University of Leeds.

Thirty-three external students in all attended these courses, in addition to the full-time registered students of the Department.

In 1926:

(1) THE MANUFACTURE OF COAL GAS.

(*a*) *Carbonization Practice* (six lectures), by Mr. T. F. E. Rhead, M.Sc., A.I.C., Chief Chemist, Birmingham Gas Department.

(*b*) *Gas Purification Practice* (six lectures), by Mr. H. Hollings, M.Sc., A.I.C., Chief Gas Chemist, Gas Light and Coke Company.

(1A) BENZOLE AS A MOTOR SPIRIT (two lectures), by Mr. W. H. Hoffert, Research Chemist, Joint Research Committee of the National Benzole Association and the University of Leeds.

(2) REFRACTORY MATERIALS.

(*a*) Eight lectures by Prof. J. W. Cobb.

(*b*) *Physical Properties of Refractory Materials* (four lectures), by Dr. H. S. Houldsworth.

Twenty-five external students attended these lectures, in addition to those in the Department itself. The numbers from outside in attendance on these courses are not nearly so large as might be expected, but are drawn from all parts of the country. Two lectures are given on one evening, to minimize time and expense in travelling.

DONATIONS.—The last session has been marked by the launching of the Appeal for the University Building Fund. Already this has met with generous support from members of the gas industry, who have contributed £8031.

STAFF.—No changes have been made in the staff of the Department in the session 1924-25. In the summer of 1926, a new branch of research was embarked upon—viz., the study of gas-works effluents, to which Dr. A. C. Monkhouse was transferred; his place being taken by Dr. C. B. Marson, who resigned the Gas Research Fellowship for the purpose.

RESEARCH.—Mr. C. B. Marson, B.Sc. (1st Class Honours), was appointed to the Gas Research Fellowship in 1924, and has continued the study of the gasification of coke. As a necessary preliminary to an examination of the influence of the ash constituents, he devoted the first year to a study of their influence on the carbonization process. The results showed that a great control over the properties of coke could be secured by means of the ash constituents. In the following session he carried this forward to the gasification of the cokes produced; and the results obtained show that their behaviour in contact with steam has been remarkably altered by the addition of certain ash constituents. For a thesis on this subject he received the degree of Ph.D. in 1926, and has been appointed to the Research Staff of the Department.

In 1926 Mr. J. A. Sutcliffe, B.A. (Jesus College, Oxford), was appointed to the Fellowship, and will continue the study of the influence of ash constituents. Mr. Sutcliffe had been engaged on physico-chemical research under Mr. D. L. Chapman, F.R.S.

Mr. A. G. Grant, B.Sc. (Corbet-Woodall Scholar), has been examining the gasification of coke in steam at low rates of steaming. For a thesis on this subject he received the degree of B.Sc. with 1st class honours, 1926. Mr. Grant has since entered the service of the Gas Light and Coke Company.

Mr. H. T. Angus, B.Sc. (Fuel and Metallurgy), has continued his metallurgical research, assisted by a grant from the Department of Scientific and Industrial Research. He has extended his work on the effect of grain size on the hardness and annealing temperature of metals. Later he has continued the study of the influence of the composition of the products of combustion on the scaling of metals, dealing particularly with mixtures containing free CO and hydrogen. For his thesis on this subject he received the degree of Ph.D., 1926, and has been awarded the first "Arthur Smithells" Scholarship, to enable him to continue this work. He is now continuing the work on scaling, assisted by a grant from the Fuel Research Board.

Mr. W. H. Blackburn, B.Sc., under the direction of Mr. Hodsman, continued the study of the removal of sulphur compounds from coal gas by high-temperature catalytic processes. For a thesis on this subject he received the degree of B.Sc. (1st class honours), and was awarded the Leblanc Medal.

Miss M. F. Eurich, B.Sc. (London), after obtaining the Diploma in Gas Engineering, carried out, under the direction of Mr. Hodsman, a study of the behaviour of carbonized fuels in an open fireplace. For a thesis on this subject she received the degree of B.Sc. (2nd class honours).

The research work of the Joint Committee of the University and the Institution of Gas Engineers has been entirely carried out in Leeds in the period under review. Dr. Parker, assisted by Mr. H. Kerr and Dr. A. C. Monkhouse, has been engaged in adapting the Corbet-Woodall experimental plant for the purpose of the systematic investigation of the factors governing the structure of coke, and the

process of carbonization. In the second year, they have carried out experiments on the influence of particle size of coal on carbonization, the results of which have been embodied in the Sixteenth Report to the Institution of Gas Engineers.

Mr. J. W. Wood, assisted by Mr. G. B. Howarth, has carried on work at the Meadow Lane Gas-Works, where facilities have been provided by the kindness of the Leeds Corporation Gas Committee. The aeration of gas burners, and, more recently, the products of combustion of coal gas in normal appliances have been studied.

Dr. H. S. Houldsworth has continued the study of the interaction of soda and silica below temperatures of fusion, and the properties of sillimanite and clay mixtures. Some of the results have been communicated to the Ceramic Society and the Society of Glass Technology. The degree of Doctor of Science was conferred by the University on Mr. Houldsworth for his research work. At the end of 1926 he resigned his post, having been called to the Bar.

Mr. Summers has been engaged upon the study of the recrystallization of metals and alloys in relation to the hardness of the material.

During the two sessions, the work of the Joint Research Committee of the University and the National Benzole Association was carried on in the Department by Mr. W. H. Hoffert, assisted by Mr. G. Claxton, on the properties of solid adsorbents suggested for use in the recovery of benzole. In order to correlate the laboratory tests of benzole with practice, a motor-car engine has been installed in the Department. The results of this and other work, such as the study of resin formation in motor spirit, have formed the subject matter of the Second and Third Reports of the Joint Benzole Research Committee.

Appointments, &c., of Graduates.

F. Allen, B.Sc.	Assistant Engineer, Gas Works, Scunthorpe.
C. E. Sanderson, B.Sc. Diploma, Gas Engineering	Supervisor, Royal Ordnance Factories, Woolwich (Assistant to Mr. W. Newton Booth, Gas Engineer).
R. J. Thomas, B.Sc.	Assistant Manager, Government Munition Factory, Poona, India.
A. M. Wandless, B.A. (Cantab.), Diploma Gas Engineering	Assistant to the National Coal Survey, Fuel Research Board.
F. C. Ferguson, B.Sc. (Lond.)	South Metropolitan Gas Company.
W. W. Firth, B.Sc.	Chemist to Asiatic Petroleum Company.
G. L. Sharpe, B.Sc.	Local Secretary (Leeds), Federation of British Industries.
D. S. Smith	Crossley Bros., Ltd.
J. A. Scott, B.Sc.	British Gas Light Company, Norwich Station.
H. D. Greenwood, M.Sc., A.I.C.	South Metropolitan Gas Company, London.
R. Neumann, B.Sc.	Chief Chemist, Blackwell Colliery Coke Ovens.
S. G. Watson, M.Sc.	W. C. Holmes & Co., Huddersfield.
F. C. Tatham, Diploma, Gas Engineering	Leeds Corporation Gas Department.
C. Stott, B.Sc.	South Metropolitan Gas Company.
C. D. Jennings, M.Sc.	E. & A. Smith & Co., Wire Manufacturers, Cleckheaton.
A. G. Grant, B.Sc.	Gas Light and Coke Company.
C. S. Sivil, B.Sc.	Metallurgist, Baker & Co., Inc., Newark, New Jersey, U.S.A.
R. C. Taylor, B.Sc.	Chief Assistant Engineer, Singapore Gas-Works.
H. Hellewell, Diploma F. and M.	Assistant Chemist, Manvers Main Colliery Coke Ovens.
I. H. S. Fraser, B.Sc.	Niagara Electrolytic Iron Company, Inc., Niagara Falls.
H. W. Pullan, M.Sc., Diploma, Gas Engineering	Radiation Ltd. (Wilsons & Mathiesons Ltd., Leeds).
J. N. Hazeldon, B.Sc.	Coal Oil Extraction, Ltd.

Graduates (June, 1925).

Master of Science (M.Sc. and B.Sc.—1st class honours)	C. B. Marson. H. T. Angus.
Bachelor of Science, Gas Engineering	W. H. Blackburn. A. G. Grant.
Diploma, Gas Engineering	Miss M. F. Eurich, B.Sc. (London). F. C. Ferguson, B.Sc. (London). C. E. Sanderson, B.Sc. (Leeds).

Graduates (June, 1926).

Ph.D.	C. B. Marson. H. T. Angus.
Bachelor of Science— 1st class honours	W. H. Blackburn. A. G. Grant.
2nd class honours	Miss M. F. Eurich.
Diploma, Gas Engineering	W. H. Blundstone, B.Sc. H. W. Pullan, M.Sc.

Works Facilities and Visits.

During the vacation, students have been given opportunities of obtaining works experience; and for these valuable facilities our thanks are due to the following. Included are the names of firms who have allowed parties of students and staff to visit their works:

Leeds Corporation Gas Department (Meadow Lane and New Wortley), Liverpool Gas Company, Calverley and Horsforth Gas Company, Bradford Corporation Gas Department, Hartlepool Gas and Water Company, Northfleet Gas Company, Winchester Gas Company, York Gas Company, Harrogate Gas Company, Whitehaven Colliery Company (Coke Ovens), Manvers Main Colliery Company (Coke Ovens), Clayton, Son, & Co., Ltd., Leeds, J. & H. McLaren, Ltd., Leeds, Wakefield Gas Company, Dewsbury Corporation Gas Department, Batley Corporation Gas Department, British Gas Light Company (Hull Station), Scarborough Gas Company, Drakes, Ltd., Halifax, Farnley Iron Cormpany, Leeds, Cambridge Gas Company, Benzole and Bye-Products, Ltd. (Crigglestone Coke Ovens).

Publications, 1924-25.

Thirteenth Report of the Gas Investigation Committee—Aeration of Gas Burners.

Fourteenth Report of the Gas Investigation Committee—Corbet-Woodall Experimental Gas Plant Carbonization Trials.

Second Report of the Joint Benzole Research Committee—Corrosion of Copper by Benzole—Use of Active Carbon and Silica Gel for Benzole Recovery.

"The Influence of the Inorganic Constituents of Coal in Carbonization and Gasification, with special reference to Nitrogen and Sulphur." C. B. Marson and J. W. Cobb.

"The Influence of Grain Size on the Hardness of Metals." P. F. Summers and H. T. Angus. J. Inst. Metals, 1925, 33, 1.

"Some Properties of Clay-Sillimanite Mixtures." H. S. Houldsworth. Trans. Cer. Soc., 1924-5, 24, 35.

"Some Properties of a Sandstone Block after use in a Glass Furnace." H. S. Houldsworth. Trans. Soc. Glass Technology, 1925, 9, 3.

"A Comparison of Solid Adsorbents proposed for Benzole Recovery." W. H. Hoffert. J. Soc. Chem. Ind., 1925, July 24.

Wm. Young Memorial Lecture. Dr. A. Parker, North British Association of Gas Managers, 1924.

"Utilization of Waste Heat from Coke Ovens." Dr. A. Parker (Coke Oven Managers' Association). "Gas World," Coking Section, 1925, April.

Annual Report on Applied Chemistry, 1924. Soc. Chem. Ind., Section on Fuel. H. J. Hodsman and J. W. Cobb.

Handbook and Souvenir, 44th Annual Meeting, Leeds, 1925, Society of Chemical Industry. H. J. Hodsman.

1925-26.

Fifteenth Report of the Gas Investigation Committee—Examination of Products of Combustion of Typical Gas Appliances.

Sixteenth Report of the Gas Investigation Committee—Studies in Carbonization. Part 1. Influence of Size of Particles.

Third Report of the Joint Benzole Research Committee—Adsorbents and Solvents for Benzole Recovery.

"Influence of Ash Constituents on Gasification of Cokes." C. B. Marson and J. W. Cobb. Gas Research Fellowship Report, 1926.

"The Smokeless Fuel Problem." Dr. A. Parker. Soc. Chem. Ind., February, 1926, Bristol Section. ("Gas Journal.")

"Calorimeters." J. W. Wood. Lecture in Manchester College of Technology. Chem. Soc., Feb. 26, 1926.

"Aeration of Gas Burners." J. W. Wood. Yorks. Jun. Gas Association, Oct. 23, 1925.

"Coal Constituents, Useful and Otherwise." H. J. Hodsman. Leeds University Mining Society Journal, 1926.

"Coke as Domestic Fuel." H. J. Hodsman. "Gas Journal," 1926, Jan. 27.

"Coke and Coke Structure." H. Kerr. Lecture to Coke Oven Managers' Association, March, 1926.

"Some Properties of Kaolin-Sillimanite Mixtures in a Commercial Silica Brick." H. S. Houldsworth. J. Soc. Glass Tech., 1926.

"Conservation of the Nation's Store of Solar Energy." Address by Prof. J. W. Cobb to "B.C.G.A.," Bournemouth. "Nature," 1925, 687.

"Electricity and Coal Consumption." J. W. Cobb. "Edinburgh Review," October, 1925.

Report of Coal Commission. Review by Prof. J. W. Cobb. "Nature," 1926.

"Coal Ash and Clean Coal." H. J. Hodsman. "Nature," 1926.

Report of Fuel Research Board. H. J. Hodsman. "Nature, 1926.

"Manufacture of Blue Water Gas." A Parker. "Nature," 1925, 115, 501.

"Economy and Efficiency in House Heating." J. W. Cobb. "Nature," 1925, 116, 349.

Haslam & Russell's "Fuels and their Combustion." Review by H. J. Hodsman. ("Gas Journal," July 21, 1926.)

I should like, in closing this report, to refer once more to the excellent character of the work which has been carried through in both teaching and research by the members of my staff, with special acknowledgment to Mr. H. J. Hodsman, the Lecturer in Gas Chemistry.

Calne's Appreciation of their Gas Manager.

At the monthly meeting of the Calne Town Council on May 9, the Gas Committee reported that the net profit on the year's working was £212. The Committee had resolved to recommend the Council to reduce the price of gas to the pre-strike figure—a reduction of 6d. per 1000 c.ft.—as from June 30 next. The electricity accounts showed a profit for the year of £48. The reports of the undertakings were considered very satisfactory. Mr. C. Cole said that the time had come when they should make some recognition of the valuable services Mr. R. W. Martin had rendered in connection with the electricity scheme in Calne. By his energy and ability, he had saved capital expenditure. The Committee recommended that Mr. Martin should be paid £50; and this was agreed to.

Reduction in Price at Bridgnorth.—The Bridgnorth Town Council Gas Committee have reduced the price of gas by 6d. per 1000 c.ft., as from the March meter readings.

Nottingham Gas Undertaking Report.—Sir Albert Ball, in moving the adoption by the Nottingham City Council of the report on the gas undertaking (*ante*, p. 388), referred to it as reflecting the greatest credit upon all concerned. The Committee managed to get through last year's upheaval without raising the price of gas, despite the fact that coal cost £116,000 more than would have been the case in normal times. When the mining dispute terminated, the Committee were fortunate in not being bound by foreign contracts. Mr. F. Jackson, who seconded the resolution, which was adopted, referred with satisfaction to the circumstance that, while the price of gas had remained unchanged, the Committee had again been enabled to contribute handsomely to the relief of the rates.

CITY AND GUILDS OF LONDON INSTITUTE.

The following questions were set in the City and Guilds of London Institute Examination in the subjects named.

GASFITTING.

GRADE I.—FIRST PAPER.

(Not more than six questions to be attempted. The maximum number of marks obtainable is affixed to each question.)

1. Discuss the relative advantages of ordinary solid and rachet stocks and dies; state in what circumstances you would use the latter. Give sketches (front and side elevation) of rachet stocks and dies, also sketches in plan of the various component parts. *(30.)*

2. Describe how you would proceed to fix a No. 4 Standard dry meter in the basement of a house (1-in. service and ¾-in. riser existing). State what material and tools you would require, and what precautions you would take to ensure a satisfactory job. *(30.)*

3. State the amount of heat in B.Th.U. per hour afforded by (*a*) a bunsen burner, (*b*) a flat flame burner, each consuming 5 c.ft. of gas per hour (calorific value of gas 500 B.Th.U.). Why are bunsen burners used on the hotplate of a gas cooker? Why are flat flame burners used in most geysers? *(25.)*

4. Fig. 1 [not given] shows at (*a*) the index of a consumer's meter at Christmas, and at (*b*) the index of same meter at Lady Day; give the readings and state the amount chargeable to the consumer in cubic feet and therms (declared value of gas 500 B.Th.U.).

Give a sectional sketch in plan of the mechanism in the attic of a dry meter. *(40.)*

5. How would you proceed to test an installation for soundness? Give sketches of any instruments that you would use. *(25.)*

6. Describe in detail how you would fix a 7-radiant gas fire in front of a coal register grate. What precautions would you take in fixing and testing to ensure a satisfactory job? State the consumption in cubic feet per hour and also in therms (475 B.Th.U. gas) when the fire is full on (pressure 2½ in.). *(35.)*

7. State how you would proceed to fix a gas cooker with three boiling burners and grill and 14-in. oven in a recess at the side of a kitchen range. The distance from the meter is 30 ft. Pressure at inlet of meter 4 in. What size of pipe would you run? Give the gas consumption of each burner in cubic feet per hour, and the total consumption with all burners full on. What would be the pressure at the cooker float with all burners full on? *(40.)*

8. Give descriptive sketches of the following: (*a*) A fitting complete, with inverted incandescent burner suitable for a passage or lavatory, (*b*) a burner-governor (in section). *(25.)*

9. Describe the construction of a modern gas iron (give sketches) and the method of fixing and adjusting. What is the best position for the control cock? *(25.)*

GASFITTING.

GRADE II.

WRITTEN.—FIRST PAPER.

(Not more than six questions to be attempted. The maximum number of marks obtainable is affixed to each question.)

1. State the essential details governing the construction of an efficient baffler.

Give a sectional drawing of the type that you would recommend. *(35).*

2. Discuss fully the relative merits of cast iron, aluminium, porcelain, brass, and gun metal in the construction of inverted burners. *(25.)*

3. Sketch approximately to scale a hot water cylinder 3 ft. high by 20 in. diameter.

State the capacity of the cylinder in gallons, and show the positions for connecting the cold supply, primary flow, and return pipes from a gas boiler, also secondary return pipe from bathroom. It is required to reduce the amount of water in active circulation by 10 gallons; describe and show by a sketch how you would arrange to do this. *(40.)*

4. Give your views as to the relative advantages and disadvantages of:

(*a*) Ace or solid flame boiling burners *versus* drilled type.
(*b*) Smooth top *versus* open hotplate.
(*c*) The various methods of controlling the air supply to cooker burners. State the type that you prefer in each case, and the reasons for your preference. *(30.)*

5. What equipment and material would you require to undertake a general overhaul of all gas burners and apparatus in a consumer's premises? *(25.)*

6. Discuss fully the question of pressure, size, and length of pipes, in relation to the volume of gas to be delivered. *(30.)*

7. What sizes of gas fires would you fix in rooms of the following areas: (1) 12 ft. by 10 ft.; (2) 15 ft. by 14 ft.; (3) 20 ft. by 18 ft.? Discuss the relative merits from the point of view of efficiency and maintenance of—

(*a*) The ordinary type of gas fire with vertical radiants.
(*b*) The inclined radiant type.
(*c*) The inset with vertical radiants.
(*d*) The "Sunbeam" type. *(30.)*

8. Give a descriptive sketch in section of a superheated type of outside lamp, and explain two methods of controlling the lighting and extinguishing from inside the premises. *(35.)*

9. What defects cause a dry meter to pass unregistered gas? State the minimum amount of gas that you would require to pass through (*a*) a 5-light meter, (*b*) a 10-light meter, (*c*) a No. 4 Standard meter, to prove in each case that all gas passing was duly registered. *(30.)*

GASFITTING.

GRADE II.—PRACTICAL.

(Candidates must attempt all questions.)

1. With the materials provided make the lead and compo. connection to the dimensions given in fig. 1. *(1¼ hours; 46 marks.)*

2. Take the geyser to pieces, and explain the travel of water and gases to the Examiner. Re-assemble the geyser, and leave it in working order. *(½ hour; 35 marks.)*

3. Fix the extending gas fire cock, and connect the gas fire with ½-in. brass tubing to conform with fig. 2; select the correct type

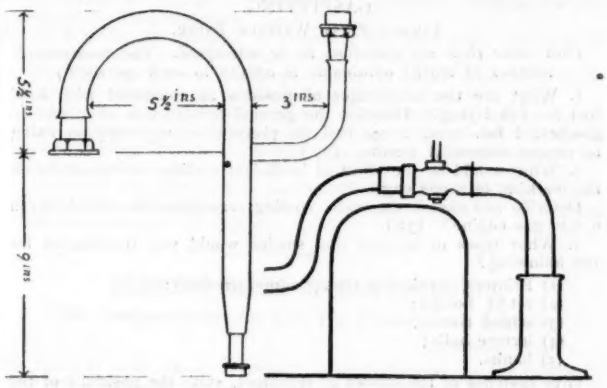


Fig. 1. Fig. 2.

Gasfitting Grade II., Practical.

of radiant, but do not fit the radiant. Adjust the burner to give the correct flame, and explain fully the construction and function of the adjusters. *(¾ hour; 42 marks.)*

4. Fit up the flue pipe to the gas cooker; the distance from the top of the flue nozzle to the top of the flue pipe is to be 4 ft., and the distance from the end of the flue pipe to the back of the elbow is to be

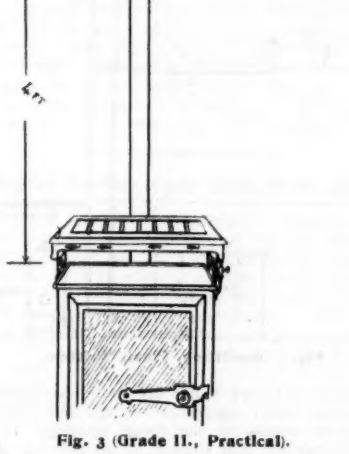


Fig. 3 (Grade II., Practical).

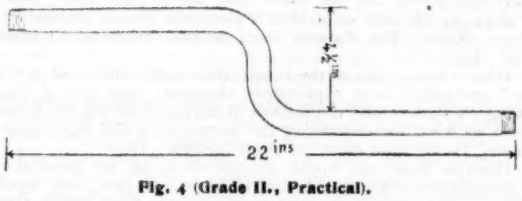


Fig. 4 (Grade II., Practical).

2 ft. 6 in., as shown in fig. 3. Fit up and adjust all burners, and give the consumption per hour of each. *(¾ hour; 42 marks.)*

5. Set the ½-in. iron pipe to conform with the dimensions given in fig. 4, and thread each end. *(¾ hour; 35 marks.)*

GASFITTING.

GRADE II.—VIVA VOCE.

(The maximum number of marks obtainable is affixed to each question.)

1. (*a*) Why is a baffler fitted on a geyser flue pipe?
(*b*) Would you fit a baffler on a circulator flue?
Give the reason for your answer. *(18.)*

2. On testing a carcassing job by pressure gauge it is proved that a slight leakage exists; no town gas is available. State exactly how you would proceed to locate and repair the fault. (*23.*)

3. Describe the principle governing the construction of a syphon stove. (*18.*)

4. A consumer complains of excessive condensation from a gas copper; to what is the trouble due?

What advice would you give to minimize the nuisance and save a further complaint? (*18.*)

5. What are the causes of the following complaints, and how would you deal with them?

(*a*) An escape of gas noticeable from a gas fire after it has been turned off.

(*b*) An escape of gas from a cooker, only detected when the cooker is in use. (*23.*)

GASFITTING.

FINAL.—FIRST WRITTEN PAPER.

(Not more than six questions to be attempted. The maximum number of marks obtainable is affixed to each question.)

1. What are the advantages of gaseous as compared with solid fuel for fish frying? Describe the general construction of a modern gas-heated fish-frying range and the precautions necessary in fixing to ensure successful results. (*35.*)

2. What would be the effect of inefficient cooling arrangements on the working of a gas engine?

Describe and sketch the water cooling arrangements suitable for a 6 H.P. gas engine? (*35.*)

3. What types of burners and shades would you recommend for the following?

(1) Printers' workshop (compositors' frames);
(2) retort houses;
(3) school rooms;
(4) lecture halls;
(5) banks.

Give sketches of the shades or reflectors, state the positions of the burners, and give the reasons governing your selection. (*35.*)

4. Discuss fully the latest developments in the construction of gas cooker ovens, giving your views as to the merits of the different types and the devices and arrangements for improving efficiency. (*30.*)

5. The drawing, fig. 1, shows an existing hot water installation.

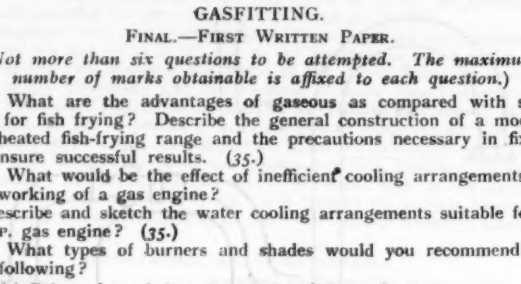


Fig. 1 (Gasfitting, Final, Written).

The kitchen range and back boiler are to the scrapped, and a complete gas-heated hot water apparatus (storage and boiler combined) is to be fixed in the recess by the range opening. It is considered advisable to increase the cold storage by 40 gallons. Assuming that the existing piping and hot water tank are in good order, describe, and show by the aid of a sketch how you would reconstruct the system. NOTE.—The distance from kitchen range to bathroom is 100 ft. (*35.*)

6. Give a description of the construction and working of a "Telephos" controller, with explanatory sketches; also give a diagram showing the battery and the method of wiring involving the minimum amount of wire, for controlling the burner of a hall light from two positions, (1) by front door, (2) from landing. (*30.*)

7. Describe how you would arrange to fit up an installation of six low-pressure superheated outside lamps, so that they would be automatically extinguished after closing hours. Give simple sketches of the special apparatus that you would employ. (*30.*)

8. State how you would proceed to test a 100-light meter *in situ* What apparatus and material would you require? (*25.*)

9. Describe fully the points of construction governing the efficiency of modern gas fires.

State the advantages and disadvantages of a duplex burner. (*25.*)

GASFITTING.

FINAL.—SECOND WRITTEN PAPER.

(The maximum number of marks obtainable is affixed to each question. Six questions to be attempted.)

1. Draw, in elevation and section, a modern high-pressure lamp. (*35.*)

2. State approximately the percentage of CO (*a*) in a straight coal gas; (*b*) in a half-and-half mixture of coal gas and carburetted water gas. What is the calorific value of CO, and how would you distinguish it from CO_2? (*30.*)

3. Draw a diagram showing the arrangement of connections for fixing two 100-light meters in parallel so that either can be removed without interfering with the supply of gas. (*40.*)

4. Define (1) an element; (2) a compound; (3) a mixture. Under which would you classify the following? Straight coal gas, water, air, CO_2, copper, aluminium, sulphuretted hydrogen. (*30.*)

5. Give sketches of a 6-in. "S" bend, a 6-in. ¼ bend, and a 6-in. ⅛ bend. (*30.*)

6. When would you use (*a*) steel, (*b*) cast iron, or (*c*) wrought iron for gas mains and services? Give your reasons. (*30.*)

7. Contrast and compare the chemical and physical properties of oxygen and hydrogen. (*30.*)

8. Give descriptive sketches and appliances used for the automatic control of street lighting. (*35.*)

GASFITTING.

FINAL.—PRACTICAL TESTS.

(Candidates must attempt all questions.)

1. Make up the 1-in. lamp arm to the dimensions given in fig. 1. Adornments to be securely fitted. (*1¼ hours; 40 marks.*)

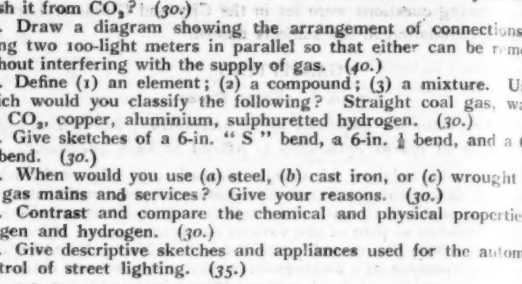


Fig 1 (Gasfitting, Final, Practical).

2. Connect the Radiation gas fire, and fix the rotary discount meter to the supply. Describe to the Examiner the principle on which the meter works. Adjust the fire and leave in working order. (*¾ hour; 30 marks.*)

3. With the materials provided make the meter connection to conform with the dimensions given in fig. 2. (*1¼ hours; 45 marks.*)

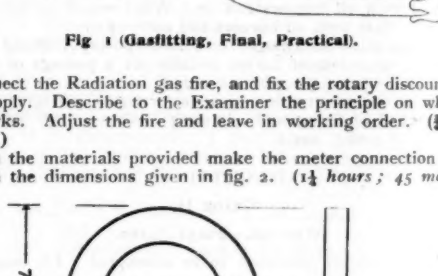


Fig. 2 (Gasfitting, Final, Practical).

4. Put the Sugg lamp and distance control apparatus in perfect working order, and explain how it operates. (*¾ hour; 30 marks.*)

5. Set the governor to reduce the pressure to 25-tenths, fit up the pressure recorder, readjust the Sugg lamp if necessary. Prove that the pressure shown on the chart is accurate. (*¼ hour; 25 marks.*)

6. Explain to the Examiner the object of the sectional construction of the gas boiler, and the direction of movement of water through sections when the boiler is working. What is the function of the part shown you by the Examiner? Prove that it is in working order or otherwise. (*¼ hour; 30 marks.*)

GASFITTING.

FINAL GRADE.—VIVA VOCE.

(The maximum number of marks obtainable is affixed to each question.)

1. Describe the construction and uses of:
(*a*) A cut-out valve.
(*b*) A night valve.
(*c*) Coleman's patent flange.
In what circumstances would you employ each fitting? (*16.*)

2. Give the efficiencies of the following:
(*a*) A high-pressure inverted burner.
(*b*) A superheated inverted burner.
(*c*) An ordinary inverted burner.
To what is the increased efficiency of (*a*) and (*b*) over the ordinary inverted burner due? (*18.*)

3. State the principle governing the construction of a "Balance" radiator, and of a safety garage radiator. (*16.*)

4. What action would you take in a case of serious gassing? (*16.*)

5. What are the causes of the following complaints, and how would you deal with them?

Insufficient supply of gas at mid-day on Sundays only. The burner of a circulator goes out when the thermostat comes into action. (*18.*)

6. Explain the principle on which the instrument shown to you is constructed. State how and in what circumstances you would employ it. (*16.*)

MINOR COURSE IN GAS SUPPLY PRACTICE.

FIRST PAPER.

(Not more than eight questions to be attempted. The maximum number of marks obtainable is affixed to each question.)

1. Name the different materials used in the construction of underground gas pipes. What are their relative advantages and disadvantages, and in what circumstances is one kind preferable to another? Describe briefly, with sketches, one form of joint for each of the different kinds of pipe. (*25.*)

2. It is desired to cut a 6-in. main and fit a 4-in. branch. Describe in detail how you would do this. A supply of not less than 1000 c.ft. of gas per hour past the branch must be provided for during the operation. (*25.*)

3. A 6-in. main extends for a distance of 400 yards from a gas-works to a point A. At A the main is diminished to 4 in. in diameter, and continues for a distance of 300 yards to B. At the point A a branch supplies a consumption of 2000 c.ft. per hour, and at B there is a consumption of 4000 c.ft. per hour. The heights above Ordnance Datum are: At the gas-works 150 ft., at the point A 300 ft., and at B 350 ft.

What pressure is required at the gas-works to produce a pressure of 3 in. at B., and what would then be the pressure at A?

The calculations should be made to the nearest tenth of an inch, assuming the truth of Pole's formula, the specific gravity of the gas being taken as 0·5 (air = 1), and the density of water as 800 times that of the air. (*25.*)

4. Describe the operation of laying a 1-in. wrought-iron service from a 4-in. main into a house, and fixing a 10-light (60 c.ft. per hour) meter. State what precautions should be taken, and name the fittings, materials, and tools required. (*25.*)

5. Describe briefly, with a sketch, the apparatus required for testing the accuracy of a meter having a nominal capacity of 40 c.ft. per hour. Detail fully the method of testing and the precautions which it is necessary to take with a wet and a dry meter respectively. (*25.*)

6. The amount of gas made, as measured by the station meter, exceeds the amount paid for and used on the works. Enumerate the various factors affecting this difference, the so-called "unaccounted-for gas." Discuss briefly the means that may be taken to reduce the effect of each of these factors. (*20.*)

7. Discuss the relative advantages and disadvantages of wrought-iron and composition pipes for interior fitting of dwelling houses. Give lists of the tools required for each of the two types of installation. (*20.*)

8. Describe, with a sketch, one form of inverted incandescent gas burner for domestic lighting. Explain the method of adjusting the burner to obtain the best result, indicating the shape and character of flame to be aimed at. In what way is the character of the flame altered when burning with, and without, a mantle? (*25.*)

9. Explain, with a sketch, the principles on which a square street lantern may be constructed to obviate difficulties caused by the effect of wind and rain on the life of the incandescent mantle. (*25.*)

10. How would you measure the illumination received by an object such as a newspaper at a distance from a street lamp? In what way does this problem differ from the determination of the illumination on a similar object from a gas light in a room? What circumstances in the room affect the amount of illumination, apart from the gas light itself? (*25.*)

11. Describe, with a sketch, a ring boiling burner suitable for use on a gas cooker provided with arrangements for regulating the proportions of gas and air. Explain how you would judge these proportions to be correctly adjusted, and state how you would expect to remedy a tendency (*a*) to light-back, and (*b*) to produce a smell when heating a pan of boiling water.

12. Describe, with sketches, three methods of igniting the charge in an Otto-cycle gas engine. Explain how you would seek to locate the fault in an engine found to be working inefficiently—*i.e.*, consuming too much gas in proportion to the work done. (*25.*)

MINOR COURSE IN GAS-WORKS PRACTICE.

FIRST PAPER.

(Not more than six questions to be attempted. The maximum number of marks obtainable is the same for each question.)

1. Sketch and describe (*a*) an hydraulic main, (*b*) a tar tower, (*c*) a retort house governor.

2. What are suitable compositions of producer and waste gases in retort settings? Give particulars of sampling and testing.

3. Compare a water-cooled with an air-cooled condenser, giving the advantages of each.

4. Sketch and describe a rotary scrubber for the removal of ammonia.

5. What chemical reactions take place when washing gas in a scrubber?

6. Sketch and describe a station meter.

7. Give particulars of a tar dehydrating plant as used in gas-works, and state the requirements of the Road Board as to the composition of tar.

8. Describe fully the method of testing purified gas for calorific value.

COKE AND BYE-PRODUCTS MANUFACTURE.—FINAL.

(1) Describe a coal washing process with which you are familiar, discussing briefly the theory of the process. (*35.*)

(2) Sketch in plan the lay-out of a modern coking plant to produce 1000 tons of coke daily, using a coal containing approximately 30 p.ct. of volatile matter. Give a short summary of the chief points in your suggested scheme. (*45.*)

(3) Write a short essay dealing with *one* of the following:

(*a*) The solid smokeless fuel problem.
(*b*) The production of *synthetic* ammonia utilizing coke oven gas.
(*c*) The manufacture of sulphate of ammonia by processes not involving the use of sulphuric acid. (*45.*)

(4) Describe and explain the use of the various physical tests of coke. (*35.*)

(5) Write an account of the process of recovering crude benzole from coke oven gas, paying special attention to any difficulties which may arise. (*35.*)

(6) What is "Grade 1" sulphate of ammonia? Discuss various methods for its production. (*40.*)

(7) Explain the methods of removing tar from coke oven gas in direct and semi-direct ammonia recovery plants. (*40.*)

(8) What are the essential requirements to ensure a practical maximum of economy in the heating of a coke oven battery? (*40.*)

(9) Write an essay dealing with the problems confronting a coke oven manager in the event of a coal dispute such as occurred in 1926. Indicate different methods of procedure, and the reasons for adopting them. (*35.*)

(10) Give the approximate composition of the effluent liquor from an ammonia still. Give a summary of methods proposed for dealing with the problem of its disposal. (*40.*)

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *May* 16.

There is little change to report in the values of tar products.

Pitch is nominally 75s. to 80s. per ton in bulk at makers' works.

Creosote is steady at 8¾d. to 9d. per gallon.

Pure toluole is 1s. 10d. to 1s. 11d. per gallon; pure benzole, 1s. 8d. to 1s. 9d. per gallon; and 95/160 solvent naphtha, about 1s. 6d. per gallon.

Phenol is quieter at about 8¾d. to 9d. per lb.

Tar Products in the Provinces.

May 16.

The average values of gas-works products during the week were: Gas-works tar, 54s. 6d. to 59s. 6d. Pitch—East Coast, 70s. to 75s. f.o.b. West Coast—Manchester, 67s. 6d. to 74s. 6d.; Liverpool, 70s. to 75s.; Clyde, 72s. 6d. to 75s. Benzole, 90 p.ct. North, 1s. 5d. to 1s. 6d.; crude, 65 p.ct. at 120° C., 1s. 0¼d. to 1s. 0¾d., naked, at makers' works; 50-90 p.ct. naked, North, 1s. 6d. to 1s. 7d. Toluole, naked, North, 1s. 6¼d. to 1s. 7¼d., nominal. Coal-tar crude naphtha, in bulk, North, 7¼d. to 8d. Solvent naphtha, naked, North, 1s. 2¼d. to 1s. 3¼d. Heavy naphtha, North, 1s. to 1s. 1d. Creosote, in bulk, North, liquid, 7¾d. to 7¾d.; salty, 7¼d. to 7¼d.; Scotland, 7¼d. to 7¾d. Heavy oils, in bulk, North, 9d. to 9¼d. Carbolic acid, 60 p.ct., 2s. 6d. prompt. Naphthalene, £11 to £14; salts, £5 to £5 10s., bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable.

Redcar Decides upon Coke Oven Gas.

The Redcar Town Council have decided to accept a supply of coke oven gas from Dorman, Long & Co., at 9d. per 1000 c.ft. for the first 100 million c.ft., and 10d. per 1000 c.ft. for all above that amount supplied annually. It was stated that the change would enable the Corporation to reduce the staff, and would result in a saving of at least £5000 a year on the gas undertaking. This economy was equivalent to a reduction in the price of gas to the consumer of 8d. per 1000 c.ft. For the average household it would mean a saving of 14s. a year. Alderman B. O. Davies explained that the increased price for all gas over the first 100 million c.ft. was intended to encourage Dorman, Long & Co. to increase their plant to ensure an adequate supply of gas for the town as it continued to develop.

Whessoe Foundry Company's Dividend.—The Directors of the Whessoe Foundry and Engineering Company, Ltd. (Darlington), recommend a dividend of 10 p.ct., less income-tax, the same as for the previous year. The date of the meeting is June 2.

Proposal to Reduce Price at Oswaldtwistle.—The Oswaldtwistle Gas Committee have decided to recommend the Council to reduce the net price to domestic consumers from 8d. to 7½d. per therm. At 7½d., the price will be just over 3s. per 1000 c.ft. net. The Committee could have granted a substantial reduction but for the fact that the Gas Department is required to bear the cost of public lighting, amounting to over £1200 per year.

Oxford Gas Company's Stock Issue.—Messrs. A. & W. Richards are issuing for the Directors of the Oxford Gas Light and Coke Company £20,000 of additional consolidated ordinary stock (ranking for a standard dividend of 5 p.ct., subject to the sliding-scale, equally with the existing similar stock, which is now receiving 10 p.ct. per annum), at the minimum price of £137 per £100; and also £6551 of 5 p.ct. perpetual debenture stock, at the minimum price of £95 per £100. This additional capital is required for the extension of the Company's Works, plant, and mains, rendered necessary by the constantly growing demand for gas. Tenders must be forwarded so as to reach the firm at 37, Walbrook, London, E.C., not later than Thursday morning, May 26.

COAL TRADE REPORTS.

From Our Own Correspondents.

NORTH-EAST COAST.

There are those who profess to have found a slightly better tone in parts of the market, but at present there cannot be said to be any material improvement. There has again been better inquiry for best Northumberland screened steams, attracted, no doubt, by the low quotation of 14s. 6d. f.o.b. which has ruled lately. Some of the collieries have been able to raise the quotation by 3d. a ton, but holders of the coal are still willing to take 14s. 6d. or even a shade less.

There is no better demand for Durham coals. Wear Special gas makes continue to ask 17s. 6d. f.o.b., and best qualities quote 16s. 6d. to 17s. 6d.; but in many cases collieries are not producing fully, and some are maintaining their price by definitely working short time. Second-class gas makes are weak, and, though nominal quotations are 14s. 9d. to 15s. 3d., even the lower price can be discounted for some brands.

Coking coal is in very poor demand, and good makes are obtainable at less than 15s. f.o.b. Durham bunkers are freely offered at 14s. 9d. to 15s. for ordinary qualities, and bests are 15s. 6d. to 16s. 6d. according to place of shipment. There is no special interest in coke of any kind. Demand is slow; but prices for gas coke are fairly steady at about 20s. to 22s. f.o.b.

YORKSHIRE AND LANCASHIRE.

There is nothing important to report in regard to the gas coal trade in Yorkshire and Lancashire this week. During the next few months inquiries will be more brisk for forward business; but as yet there is no indication as to a stabilized district basis.

House coal is declining in request, and prices have been variously reduced in accordance with the position at each pit. Stocks, however, continue to accumulate, and in the absence of normal export trade collieries are working shorter time.

The industrial situation generally does not improve, and collieries not having sold far ahead under contracts are faced with the position of having to take lower prices.

The following are the Humber bunker and export prices f.o.b. usual shipping ports: South Yorkshire—Hards, Association, 18s.; screened gas coal, 18s. 6d. to 19s. 6d.; washed trebles, 19s.; washed doubles, 18s. to 18s. 3d.; washed singles, 17s. 6d. to 17s. 9d.; washed smalls, 15s. 9d. to 16s.; rough slack, 14s. 9d. to 15s.; smithy peas, 19s. 6d. to 20s. per ton. West Yorkshire—Hartley's (f.o.b. Goole), 16s. 3d. to 17s. 3d.; screened gas coal, 17s. 6d. to 18s.; washed trebles, 17s. 6d. to 18s.; washed doubles, 17s. to 17s. 6d.; washed smalls, 15s. 6d. to 15s. 9d.; unwashed trebles, 17s. to 17s. 6d.; unwashed doubles, 16s. to 17s.; rough slack, 14s. to 14s. 3d. per ton. Derbyshire-Nottinghamshire—Top hards, 19s. to 21s.; washed trebles, 19s. to 20s.; washed doubles, 18s. to 18s. 3d.; washed singles, 18s. to 18s. 3d.; washed smalls, 15s. 6d. to 16s.; unwashed doubles, 17s. to 18s.; rough slack, 14s. 6d. to 14s. 9d. per ton. Yorkshire, Derbyshire, and Nottinghamshire—Screened steam coal, 16s. to 18s.; gas coke, 23s. 6d. to 27s. 6d.; furnace coke, 21s. 6d. to 22s. per ton.

MIDLANDS.

Midland collieries are now feeling the competition of water-borne coal from the North-East Coast over a considerable part of the southern area which they have been serving. The difference of freights enables shippers to penetrate the shores of the English Channal to a considerable depth. Employment at the pits continues to decline. Some collieries which have made bold cuts in prices are able to find fairly steady employment. Readiness to accept lower prices is not the only pre-requisite of quickened trade, however.

So far as household qualities are concerned business depends in large measure on the suitability of coals for stocking. While the general trend of prices in this department is downward, reductions are sporadic. Quotations range from 20s. or a little more to 33s. at the pithead; the latter being the figure for special deep coal, hand-picked.

No material change is to be noted in the industrial market. Slacks and D.S. nuts are relatively strong; the former at 13s. to 10s., and the latter at 8s. 6d. to 11s. 6d. Steam coals are offered at 17s. 6d. upwards. Intensified competition between the different coalfields results in greater irregularity of quotations.

The most significant development relates to hard cokes. Blast-furnacemen are able to arrange supplies at 17s. 6d. on rail, and there has been a corresponding drop in pig iron. Gas coke is available at easier rates. Spot lots are to be had on more favourable terms than the 32s. 6d. quoted by big undertakings.

Dukinfield Gas Balance-Sheet.—The net loss for the year ended March 31 of the Borough of Dukinfield Gas Department was £2067; the gas rental having amounted to £21,958, as compared with £18,828 in the previous year. The report of the Manager (Mr. George Lindley) states that the sales of gas totalled over 103 million c.ft., an increase of 4 millions. For the year ended March, 1926, there was a profit of £1603.

Cape Town and District Gas Light and Coke Company, Ltd.—The report of the Directors for the year ended Dec. 31 last, which will be submitted at a meeting of shareholders to-day, shows the balance at credit of revenue account to be £20,091, which, together with £4343 brought forward from the previous year's accounts, makes a total of £24,435. The available balance is £7935, out of which the Directors recommend the payment of a final dividend on the ordinary shares of 4 p.ct. (making 7 p.ct. for the year). This will absorb £4000, and leave to be carried forward to the next year's account the sum of £3935. The volume of gas sold increased by 5·17 p.ct.

CONTRACTS OPEN.

Coal.

Tenders for coal are invited by the Nantwich Gas Department. [See advert. on p. 454.]

Gas coal tenders are invited by the Penrith Urban District Council. [See advert. on p. 454.]

The Droitwich Corporation are inviting tenders for gas coal or nuts. [See advert. on p. 454.]

Tenders are invited by the Newbury Corporation for the supply of gas coal. [See advert. on p. 454.]

The East Dereham Urban District Council are inviting tenders for the supply of gas coal. [See advert. on p. 454.]

Tenders are invited by the Hebden Bridge and Mytholmroyd Gas Board for the supply of gas nuts. [See advert. on p. 454.]

Governor.

Tenders for the supply and fixing of a station governor are invited by the City of Stoke-on-Trent Gas Department. [See advert. on p. 454.]

Oxide of Iron.

Tenders for the supply of new oxide and the purchase of spent oxide are invited by the Rochdale Gas Department. [See advert. on p. 454.]

Painting Gasholders, &c.

The Newbury Corporation are inviting tenders for the painting of two gasholders, &c. [See advert. on p. 454.]

Retorts, &c.

The Gas Committee of the Penrith Urban District Council are inviting tenders for the resetting of a bed of retorts. [See advert. on p. 454.]

Street Lanterns.

Tenders are invited by the Dublin Public Lighting Department for the supply of street lanterns. [See advert. on p. 454.]

Tar.

Tenders are invited by the Penrith Gas Committee for the purchase of their surplus tar. [See advert. on p. 454.]

Vitriol.

The Rochdale Gas Department are inviting tenders for the supply of B.O. vitriol. [See advert. on p. 454.]

London County Council and Meter Testing.—The return for the quarter ended March 31 shows that of meters tested at the London County Council offices 74,148 were stamped, and 13,251 were rejected. Of those tested *in situ* five were stamped, and none rejected. The total income derived from fees received for the testing of gas meters amounted to £5820.

Wandsworth Gas Company Back to Pre-Strike Prices.—The Wandsworth, Wimbledon, and Epsom District Gas Company are reducing their prices of gas from the Midsummer readings of the meters by 1d. a therm. This, which is the second reduction since April, will make the prices the same as before the strike. The new charges will be: Wandsworth, 8⅝d.; Wimbledon, 9⅝d.; and Epsom, 10⅜d. per therm.

L.C.C. and Gas Charges.—At a meeting of the London County Council on Tuesday, May 10, Mr. W. J. Morton, Chairman of the Public Control Committee, replying to a question by Mr. J. D. Gilbert regarding protests in the Press as to the high prices charged to consumers in London by Gas Companies, said the standard prices were fixed by the Board of Trade, except in the case of the South Metropolitan Gas Company, which was not subject in this respect to the Gas Regulation Act. If at any time it could be shown that the cost of production had substantially altered, due to circumstances beyond the control of the Companies, the Council was entitled to apply to the Board for a revision of the standard prices. The matter was kept under constant observation, and the Council would be recommended to take action in the direction indicated if, and when, occasion arose. Except in the case of the Commercial Gas Company, the present standard prices were settled before the increase in the cost of coal, due to the stoppage in the coal industry, took place. The present standard price of the Commercial Company (12·6d. per therm) was a temporary one granted on account of the increase in costs due to the coal stoppage. It would remain in force until Dec. 31 next, when the standard price would revert to 11·4d. per therm.

Primitiva Gas Company of Buenos Aires, Ltd.—At the annual meeting on Tuesday, May 24, the Directors will submit accounts showing a profit for the year ended Dec. 31 of £97,947, out of which there has been allocated to contingencies reserve £11,731, and to depreciation and renewals account £74,608, leaving to be carried forward £11,608. The re-organization of the various departments of the undertaking has proceeded steadily throughout the year; and the Board are pleased to report progress, which is reflected in the above financial results. The new installation of Glover-West vertical retorts was put into operation on Sept. 1; and the results obtained realize the expectations based upon the contractors' guarantees. Last June the Chairman visited Buenos Aires to communicate in person the policy of the Board and the methods to be pursued in the future conduct of the business. Later in the year Sir Manuel Montes de Oca, G.B.E. (Chairman of the Local Committee in Buenos Aires), visited London; and the Board had the great advantage of conferring with him upon matters of importance in connection with the Company's affairs. In October last Mr. Bernard F. Browne, M.Inst.C.E., of Santos, retired from the Local Committee; and the Board place on record their appreciation of his services.

STOCK MARKET REPORT.

THE failure of the anticipated Bank Rate reduction to materialize had little effect on the prices of gilt-edged stocks last week; but towards the close there was less activity, and values, except perhaps Victory Bonds, showed no improvement. The lists were opened for the big New South Wales 5½ p.ct. Conversion Loan, and Colonial descriptions generally were in fair demand. A sensible decision is the removal of the ban on new Corporation stocks that have been placed privately; and dealing is expected to open on Monday in the £300,000 Ipswich 5 p.ct. redeemable stock.

An item of interest to gas companies is the proposed issue of £750,000 5½ p.ct. debentures by the Horden Colliery to be offered at 98, in respect of which underwriting is now in progress.

In the Foreign Market, French Rentes were again to the fore, and Chinese issues improved on the Foreign Secretary's statement in regard to the outrages in Nanking and elsewhere.

In the Industrial and Miscellaneous markets Artificial Silks predominated, with Store shares and Oils a good second or third. Tobaccos continued to be depressed.

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf. Yr	Dividends. Last Hf. Yr.	NAME.	Quotations. May 13.	Rise or Fall on Week.	Transactions. Lowest and Highest Prices.
£			% p.a.	% p.a.				
171,978	Stk.	Feb. 10	5	5	Aldershot 5 p.c. max. C.	70—73	..	
228,992	,,	,,	4	4	Do. 4 p.c. Pref.	68—71	..	71
1,551,868	,,	Apl. 7	6½	7	Alliance & Dublin Ord.	83—86	..	..
274,000	,,	Jan. 13	4	4	Do. 4 p.c. Deb.	65—68	..	84½—86
200,000	1	Apl. 28	1/7½	1/7½	Bombay, Ltd.	1—1½	..	
170,000	10	Mar. 10	6½	6½	Bournemouth 5 p.c.	12½—13½	..	21/3
400,050	10	,,	7	7	Do. B 7 p.c.	11½—12½	..	..
275,000	10	,,	6	6	Do. Pref. 6 p.c.	10½—11½	..	12½
80,000	Stk.	Jan. 13	3	3	Do. 3 p.c. Deb.	55—58	..	..
163,025	,,	,,	4	4	Do. 4 p.c. Deb.	75—78	..	..
327,900	,,	—	—	—	Brighton & Hove 6 p.c. Con.	102—107	+2	76½
241,800	,,	—	—	—	Do. 5 p.c. Con.	90—95	..	104
1,327,500	,,	Feb. 24	5	5	Bristol 5 p.c. max.	89—90a	..	..
555,000	,,	Mar. 24	8	7	British Ord.	105—108	..	..
100,000	,,	Dec. 30	7	7	Do. 7 p.c. Pref.	112—117	..	108—109
180,000	,,	,,	4	4	Do. 4 p.c. Red. Deb.	75—80	..	..
180,000	10	Dec. 9	6	6	Cape Town, Ltd.	7½—8½	..	..
150,000	10	Apl. 28	4½	4½	Do. 4½ p.c. Pref.	6—7	..	..
150,000	Stk.	Dec. 30	4½	4½	Do. 4½ p.c. Deb.	68—73	..	..
696,980	,,	Feb. 24	6	6	Cardiff Con. Ord.	99—102	..	..
227,880	,,	Dec. 30	7½	7½	Do. 7½ p.c. Red. Deb.	100—103	..	..
157,150	,,	Feb. 24	5	5½	Chester 5 p.c. Ord.	88½—91½b	..	..
79,185	1	Apl. 28	†2/-	†2/-	Colombo Ltd. Ord.	26/—28/-	..	..
94,495	1	,,	1/4½	1/4½	Do. 7 p.c. Pref.	20/—22/-	..	21/6—21/9
891,490	1	Apl. 7	1/9½	1/9½	Colonial Gas Assn. Ld. Ord.	24/6—26/6	..	..
178,900	1	,,	1/7½	1/7½	Do. 8 p.c. Pref.	20/—22/-	..	..
1,818,280	Stk.	Feb. 24	5½	5½	Commercial 4 p.c. Cap.	86—89	+1	86½—87½
550,000	,,	,,	5/3/4	5/3/4	Do. 3½ p.c. Cap.	85—88	+1	85—86
475,000	,,	Dec. 30	5	5	Do 3 p.c. Deb.	54—57	..	55—56
800,000	,,	Sept. 30	‡2	‡1	Continental Union, Ltd.	30—35	+2	31
200,000	,,	Mar. 10	7	7	Do. 7 p.c. Pref.	79—82	..	..
727,560	,,	Mar. 10	6½	6½	Croydon sliding scale	96—99	..	..
408,100	,,	,,	5	5	Do. max. div.	77—80	..	..
492,270	,,	Feb. 24	6	9	Derby Con.	104—106e	..	..
66,000	,,	Dec. 30	4	4	Do. Deb.	73—75c	..	..
309,000	,,	Mar. 10	5	5	East Hull Ord. 5 p.c.	76—80	..	..
50,000	,,	Dec. 30	5	5	Eastbourne 5 p.c. Deb.	92 97	..	..
1,092,180	10	Mar. 24	13	13	European, Ltd.	6—7	+½	6½—6½
18,747,460	Stk.	Feb. 10	5/1/4	5	Gas Light & Coke 4 p.c. Ord.	86½—88½	..	86—87¾
2,600,000	,,	,,	3½	3½	Do. 3½ p.c. max.	59—61	..	60—6
4,157,020	,,	,,	4	4	Do. 4 p.c. Con. Pref.	76—78	..	76 77
5,602,620	,,	D c. 30	3	3	Do. 3 p.c. Con. Deb.	58—60	..	59—59½
2181,815	,,	,,	—	6	Do. 6 p.c. Br'tf'd Rd. Db.	100 105	..	100½ 103
1,642,770	,,	,,	—	5	Do. 5 p.c. Red. Deb.	99—101	..	..
42,000	,,	—	7½	7½	Do. 7½ p.c. Ilford Deb.	..	..	..
84,500	,,	Mar. 10	6½	6½	Hastings & St L. 5 p.c. Conv	90—92	..	..
258,740	,,	,,	5½	5½	Do. 3½ p.c. Conv.	67—72	..	70
70,000	10	Apl. 28	†10	†10	Hongkong & China, Ltd.	12—18	..	12 7/16
172,200	Stk.	Mar. 10	5	5	Hornsey Con. 3½ p.c.	67—69	..	..
1,976,000	,,	May 12	10	10	Imperial Continental Cap.	137—141*	—3½	137—143
223,180	,,	Feb. 10	3½	3½	Do. 3½ p.c. Red. Deb.	69—71	..	..
235,242	,,	Mar. 10	6½	6½	Lea Bridge 5 p.c. Ord.	92—97	..	..
3,145,907	,,	Feb. 24	5½	5½	Liverpool 5 p.c. Ord.	84½—85½b	+¾	84¾
400,000	,,	Sept. 30	7	7	Do. 7 p.c. Red. Pref.	102—104b	..	..
165,786	,,	Feb. 24	9	8	Maidstone 5 p.c. Cap.	110—115	..	..
68,480	,,	Dec. 30	3	3	Do. 3 p.c. Deb.	52—57	..	..
75,000	5	Dec. 9	†7	†7	Malta & Mediterranean	5½—5¾	..	..
541,920	Stk.	Nov. 25	†6	†5	Montevideo, Ltd.	85—90	+4	..
2,061,815	,,	Feb. 24	5	5	Newcastle & Gateshead Con.	74½—75½d	..	..
260,929	,,	,,	4	4	Do. 4 p.c. Pref.	68½—69½d	..	..
691,705	,,	Dec. 30	3½	3½	Do. 3½ p.c. Deb.	68—69d	..	..
131,785	,,	—	—	—	North Middlesex 6 p.c. Con.	91—93	..	..
300,000	,,	Apl. 28	9	7	Oriental, Ltd.	97—102	..	..
188,120	,,	Dec. 30	7½	7½	Plym'th & Ston'house 5 p.c.	105—110	..	..
414,500	,,	Feb. 24	7½	7½	Portsm'th Con. Stk. 4p.c. Std.	100—105	..	..
286,732	,,	,,	5	5	Do. 5 p.c. max.	76—79	..	..
2,389,909	1	—	—	—	Primitiva Ord.	15/—16/-	—/3	15/1½—15/10½
282,200	100	Dec. 1	4	4	Do. 4 p.c. Red. Deb.	85—87	..	..
600,000	Stk.	Jan. 27	4	4	Do. 4 p.c. Red. Deb. 1911	70—72	..	..
434,963	,,	Dec. 30	—	4	Do. 4 p.c. Cons. Deb.	70—72	..	71—71½
160,000	10	Mar. 24	6	6	San Paulo 6 p.c. Pref.	7½—7¾	..	..
125,000	50	July 1	5	5	Do. 5 p.c. Red. Deb.	47—50	..	..
270,000	Stk.	Mar. 24	5½	5½	Sheffield A	95—97e	..	..
419,968	,,	,,	5½	5½	Do. B	95—97e	..	..
1,047,000	,,	,,	5½	5½	Do. C	95—97e	..	..
90,000	10	June 11	4	—	South African	4—6	..	..
5,609,895	Stk.	Feb. 24	5	7	South Met. Ord.	100—102	..	100½—101½
1,895,445	,,	Jan. 13	3	3	Do. 3 p.c. Deb.	57—60	..	58½—59
734,000	,,	Mar. 10	6½	6½	Do. 6½ p.c. Red. Db.	99—101	..	..
91,500	,,	Feb. 24	8½	8½	South Shields Con.	104—106d	..	..
1,243,795	,,	Mar. 10	6½	6½	South Suburban Ord. 5 p.c.	102—105	..	103—103½
868,837	,,	Dec. 30	5	5	Do. 5 p.c. Deb.	93 96	..	94
647,740	,,	Mar. 24	5	5	South'mpton Ord. 5 p.c. max.	74—77	..	75½—76½
121,275	,,	Dec. 30	4	4	Do. 4 p.c. Deb.	68—73	..	..
250,000	,,	Feb. 24	7	7	Swansea 7 p.c. Red. Pref.	100—102	..	..
200,000	,,	Dec. 30	6½	6½	Do. 6½ p.c. Red. Deb.	102—104	..	..
120,000	,,	Feb. 24	7½	7½	Tottenham District A 5 p.c.	105—110	..	..
893,275	,,	,,	6½	6½	Do. B 3½ p.c.	89—92	..	91½—92
150,000	,,	,,	6½	6½	Do. 3½ p.c. Pref.	97—100	..	..
181,265	,,	Dec. 9	4	4	Do. 4 p.c. Deb.	72—75	..	..
288,251	,,	Mar. 10	5	5	Tynemouth Con. and New Uxbridge, Maidenhead, & Wycombe 5 p.c.	69 71d	..	..
197,294	,,	Mar. 10	6½	6½	Do. 5 p.c. pref.	85—90	..	..
88,330	,,	,,	5	5	Do. 5 p.c. Maidenh'd	88—88	..	..
91,860	,,	,,	6½	6½	Wandsworth, Wimbledon, and Epsom—	88—88	..	..
50,000	,,	Mar. 10	8½	8½	Wandsworth A 5 p.c.	120—125	..	..
355,966	,,	,,	7	7	Do. B 3½ p.c.	102—107	..	..
433,535	,,	,,	5/19/0	5/19/0	Do. C and New	90—95	..	..
952,000	,,	,,	6½	6½	Wimbledon 5 p.c.	98—103	..	..
98,000	,,	,,	7½	7½	Epsom 5 p.c.	103—108	..	..
88,416	,,	Dec. 30	8	8	3 p.c. Deb.	54—57	..	..

Quotations at:—a.—Bristol. b.—Liverpool. c.—Nottingham. d.—Newcastle. e.—Sheffield. * Ex. div. † Paid free of income-tax ‡ For year.

The Gas Market was all that could be desired. Brighton and Hove 6 p.ct. consolidated were marked up 2 points to 102-107; Commercial two stocks, which it is proposed under the Company's Bill now before Parliament to merge into ordinary stock with a basic dividend of 5 p.ct., both rose one point; and Liverpool 5 p.ct. improved ¾ at the local exchange. Of the companies operating abroad, the feature of the week was the rise of 4 points in Monte Video to 85-90, due doubtless to the rise of 1 p.ct. in the dividend paid for the year. It is rumoured that the necessary acceptances of preference shares of the South Metropolitan Gas Company in exchange for ordinary stock of the South Suburban Gas Company under the arrangement between the two Companies, to which reference was made last week, have been obtained, and that the lists are now closed. It must be gratifying to the management of both concerns to know that the arrangement is appreciated by the holders of the South Suburban stock.

The following transactions were recorded during the week:

On Monday, Bombay 21s. 3d., British 103, 108, Commercial 3 p.ct. debenture 55, European 6½, 6¼, Gas Light and Coke 86⅝, 86⅞, 87, 87⅛, 4 p.ct. preference 76½, 3 p.ct. debenture 59, 59½, 6 p.ct. Brentford debenture 100⅝, Imperial Continental 143, Primitiva 15s. 4½d., 15s. 6d., 15s. 7½d., 15s. 9d., 15s. 10½d., South Metropolitan 100⅝, 100¾, 101⅛, 101¼, South Suburban 103¾, Tottenham "B" 91½. Supplementary prices, Hornsey 5 p.ct. preference 84¼, 84½, Sunderland 6 p.ct. maximum 95, 95½.

On Tuesday, Alliance and Dublin 85, Bournemouth 4 p.ct. debenture 76½, Brighton and Hove 6 p.ct. 104, Commercial 3 p.ct. debenture 55, Gas Light and Coke 86½, 86⅝, 86¾, 87, 87½, 4 p.ct. preference 76½, 76¾, Imperial Continental 143, Primitiva 15s. 4½d., 15s. 7½d., 4 p.ct. consolidated debenture 71, 71½, South Metropolitan 100¾, South Suburban 5 p.ct. 103¾. Supplementary prices, Ascot 6 p.ct. preference 10½, Barnet 5 p.ct. debenture 97½, Danish 8½, Derby 5 p.ct. 101.

On Wednesday, Alliance and Dublin 84½, 86, Commercial 4 p.ct. 86½, 87½, 3½ p.ct. 85, 85½, 86, 3 p.ct. debenture 56, European 6½, 6 13/16, 6⅞, Gas Light and Coke 86½, 86⅝, 87, 87½, 87⅝, 87⅞, 3½ p.ct. maximum 61, 4 p.ct. preference 76½, 77, 3 p.ct. debenture 59, 59½, 59¾, 6 p.ct. debenture 103, Imperial Continental 142, 143, Primitiva 15s. 1½d., 15s. 3d., 15s. 4½d., South Metropolitan 100¼, 100¾, 101, 3 p.ct. debenture 58¾, Tottenham "B" 91½, 92. Supplementary prices, Barnet 5 p.ct. debenture 98, Danish 8½, Liverpool 5 p.ct. 84.

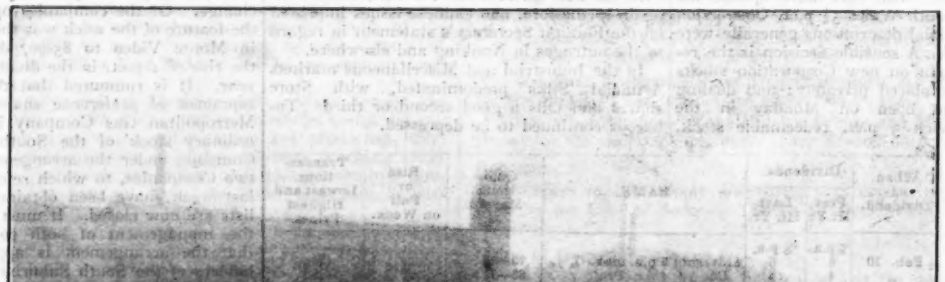
On Thursday, European 6⅝, 6½, Gas Light and Coke 87¼, 87⅜, 87½, 87⅞, 4 p.ct. preference 76, 76½, 77, 3 p.ct. debenture 59, 59½, Imperial Continental 137, 137½, 142 *ex* div., Primitiva 15s. 1⅛d., 15s. 3d., 15s. 4½d., 15s. 5½d., South Metropolitan 100¾, South Suburban 5 p.ct. 103, 5 p.ct. debenture 94. Supplementary prices, Danish 8 13/16.

On Friday, Aldershot "C" 71, Bournemouth "B" 12⅞, British 107, Colombo 7 p.ct. preference 21s. 6d., 21s. 9d., Commercial 4 p.ct. 86½, 3½ p.ct. 85½, Continental Union 31, Gas Light and Coke 87, 87⅛, 87⅛, 87⅜, 87⅝, 3½ p.ct. 60½, 4 p.ct. preference 76½, 3 p.ct. debenture 59, Hastings 3½ p.ct. converted 70, Hong Kong and China 12 7/16, Imperial Continental 138, Primitiva 15s. 3d., 15s. 6d., South Metropolitan 100, 100¾, 3 p.ct. debenture 59, South Suburban 5 p.ct. 103½, Southampton 5 p.ct. maximum 75⅞, 76⅞. Supplementary prices, Hornsey 5 p.ct. preference 84½, Rochester, Chatham 80⅞, Southgate 7½ p.ct. debenture 102½.

In Lombard Street loan rates were lower towards the end of the week. Old day-to-day advances were renewed at 3½ p.ct. and new money at 3¼ p.ct. Unless the gold position of the Bank is substantially strengthened, it is unlikely that there will be a further change in the Bank Rate. The full amount of Treasury Bills offered was allotted, but the amount applied for was lower than it has been for several months. The average percentage at which Bills were allotted was 5d. higher at £3 12s. 0·64d. p.ct.

Silver was a quiet market, China both buying and selling with the price at 26d. per oz. No Gold was available.

The Bank Rate is 4½ p.ct., to which it was reduced from 5 p.ct. on April 21. Bankers' deposit rates are 2½ p.ct. The deposit rates of the discount houses are 2½ p.ct. at call and 2¾ p.ct. at notice.



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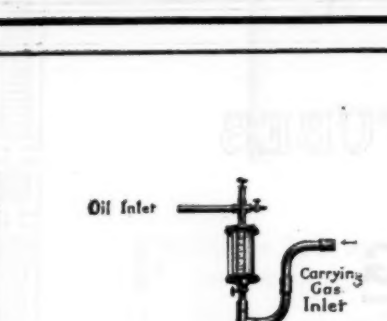

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